OCTOBER 6, 1952

Electrical World

Price 35 Cents

A McGRAW-HILL PUBLICATION

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5/8% Step Voltage Regulators

Get More Feeder Revenue NOW!

WHY LOSE REVENUE while waiting for overloaded feeders to be rebuilt? You can bring feeder voltage to maximum efficiency at low cost with Allis-Chalmers distribution regulators. And you'll be cutting out customer complaints due to low voltage.

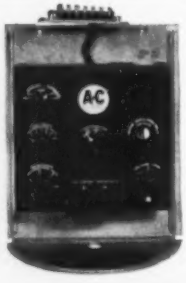
Best of all, these regulators give you low-cost insurance against poor voltage anywhere in your system. It's easy to shift regulators from feeder to feeder as needed — mounting and placing them in operation is simple and fast.

Call your nearest A-C district office to find out how you can increase revenue *now* with Allis-Chalmers distribution regulators. Or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3861

RATINGS AVAILABLE

7620 Volts—15, 50, 100 amp
5000 Volts—50, 100 amp
2500 Volts—100, 200 amp

Allis-Chalmers distribution regulator provides a narrow, accurate ± 1 volt band on a southeastern feeder.



Installation is Fast; Maintenance is Easy

"Feather-Touch" controls of Allis-Chalmers distribution regulators are one reason why installation is so fast and simple. There is only one adjustment to make: setting the voltage level. Voltage band is pre-set at the factory. A convenient calibrated scale plus a large, finger-fit knob makes setting the voltage level especially easy.

Maintenance is simplified by a single jack plug that connects all wiring to the regulator. The control can be removed and replaced in a short time. Your linemen don't have to be technical experts because the control can easily be sent back to the shop for a thorough checkup.

The complete story of "Feather-Touch" controls is contained in the booklet "Feather-Touch Controls on Allis-Chalmers Distribution Regulators," 01M7866-1. Write for it.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Originators of 5/8% Step Regulation

We Planned It That Way

Readers of this issue may get the idea that when the editors were putting it together they got a bit mixed up. News and engineering stories which for so many years have been kept separate are intermingled. Not all the news stories are in the front of the book, not all the technical stories in the back. But this is no mix-up.

The change is entirely logical. It is recognition of the fact that the technical progress of the industry contains much that is news and that news of industry progress contains much that is of technical interest. Hence they deserve treatment on equal footing. We welcome readers comments.

No departments have been dropped. For their new locations see Contents at right.

Standards Are His Business

E. V. De Blieux, author of "Power Transformers Now Covered by New American Standards," (p 88), is a standards man from way back. He says he likes standards work because he believes in them. For many years his work at General Electric Co, which he joined in 1922, involved standardization of GE designs. He just grew from there into work on national standards. He developed the standard for testing rectifier transformers which is now used all over the world.

During the year's absence of Chairman H. M. Jalonack with the Office of Price Stabilization, De Blieux as deputy chairman of the ASA C57 Subcommittee for Power and Distribution Transformers directed the work of the committee in standardizing power transformers. This made him the logical man to write the article in this issue.

The manager of transformer apparatus engineering for GE at Pittsfield is a graduate of Purdue. Of French ancestry, he is a native of Natchitoches (rhymes with mackintosh), La., fourth oldest city in the United States. It was founded by the Spaniards as a mission base.

De Blieux has become a lover of Cape Cod and spends his vacations there. He likes West Dennis because he says the water is warmer there, and "we Louisiana boys like our water warm."

Electrical World

Published for 78 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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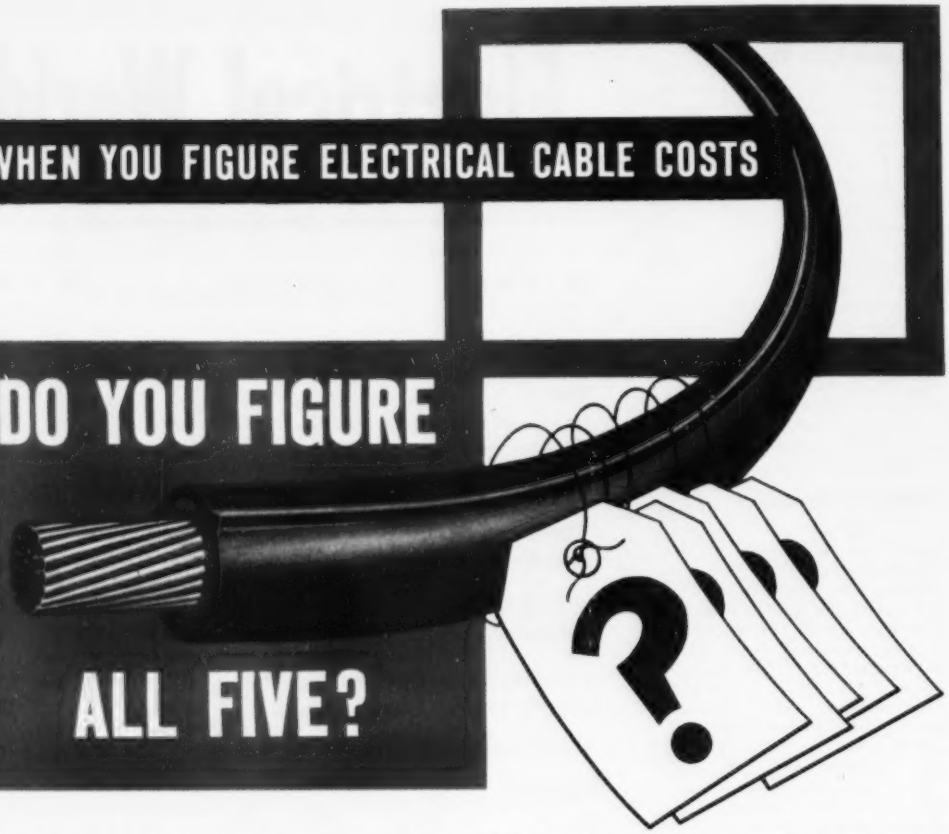
WHEN YOU FIGURE ELECTRICAL CABLE COSTS

DO YOU FIGURE



ALL FIVE?

All too often electrical cables are purchased solely on the basis of initial cost. Actually, of course, this is only one of five factors to consider . . . and no true cost comparison can be made until the four "hidden" costs are figured.

Here are the four "hidden" costs which often upset your overall budget, particularly when you're trying to "economize":

- **installation costs**
- **maintenance costs**
- **costs of power shutdowns when a cable fails**
- **costs of replacing a cable which has failed prematurely.**

Okonite cables are the most effective means for combating these costs. A wide range of Okonite cable designs assures you of the most economical installation for any type of operating condition. And for savings throughout the life of the cable, Okonite always uses the premium materials and exclusive processing techniques which deliver unfailing electrical service year in and year out.

We can't condense millions of man-hours of cable research, field engineering and manufacturing experience into a short description of Okonite cables. But your Okonite representative can show you in black and white why the best cables – Okonite cables – really carry the lowest overall cost. The Okonite Company, Passaic, N. J.

The best cable is your best policy

OKONITE OKONITE SINCE 1878 ***insulated wires and cables***

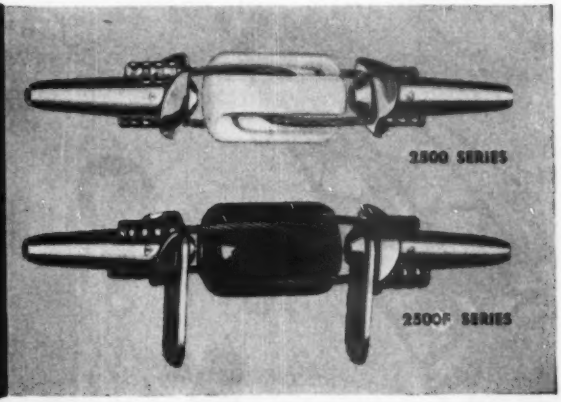
for the largest number of line applications at the lowest possible cost...

USE

Electroline

Insulating
Automatic
Line Splice

SECTIONALIZERS



The Electroline Sectionalizers are assemblies that will function in service as most convenient, reliable and yet low cost interrupting devices. Series 2500-F and 2600 provide for paralleling with a fuse element for further protection when sectionalizing. The mechanical strength of these assemblies exceeds in all cases the rated breaking strength of the conductor for which they are adapted.

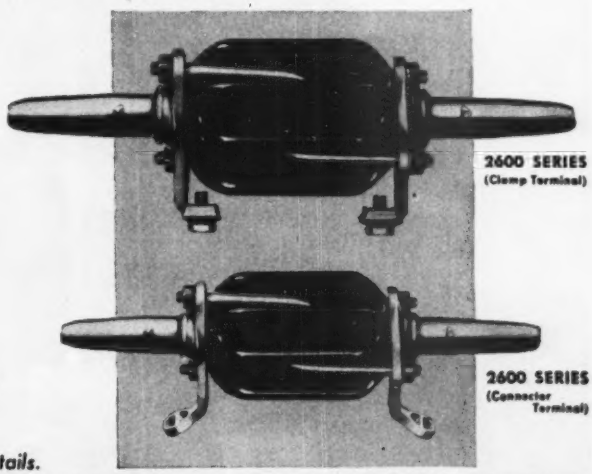
These Insulating Automatic Line Splice Sectionalizers are ideal for:

Installing Regulating Equipment,
simplifies cutting-in disconnecting points, fuses, voltage regulators and series capacitors;

Restoring Service,
providing points to test for trouble;

Sectionalizing Networks,
to readily isolate and test the area in trouble;

Series Street Lighting,
simplifies cutting-in series street lamps—merely cut the line and insert conductor ends into sectionalizer.



Send for Bulletins containing complete details.

PATENT TO ORIGINATE E ABILITY TO PRODUCE

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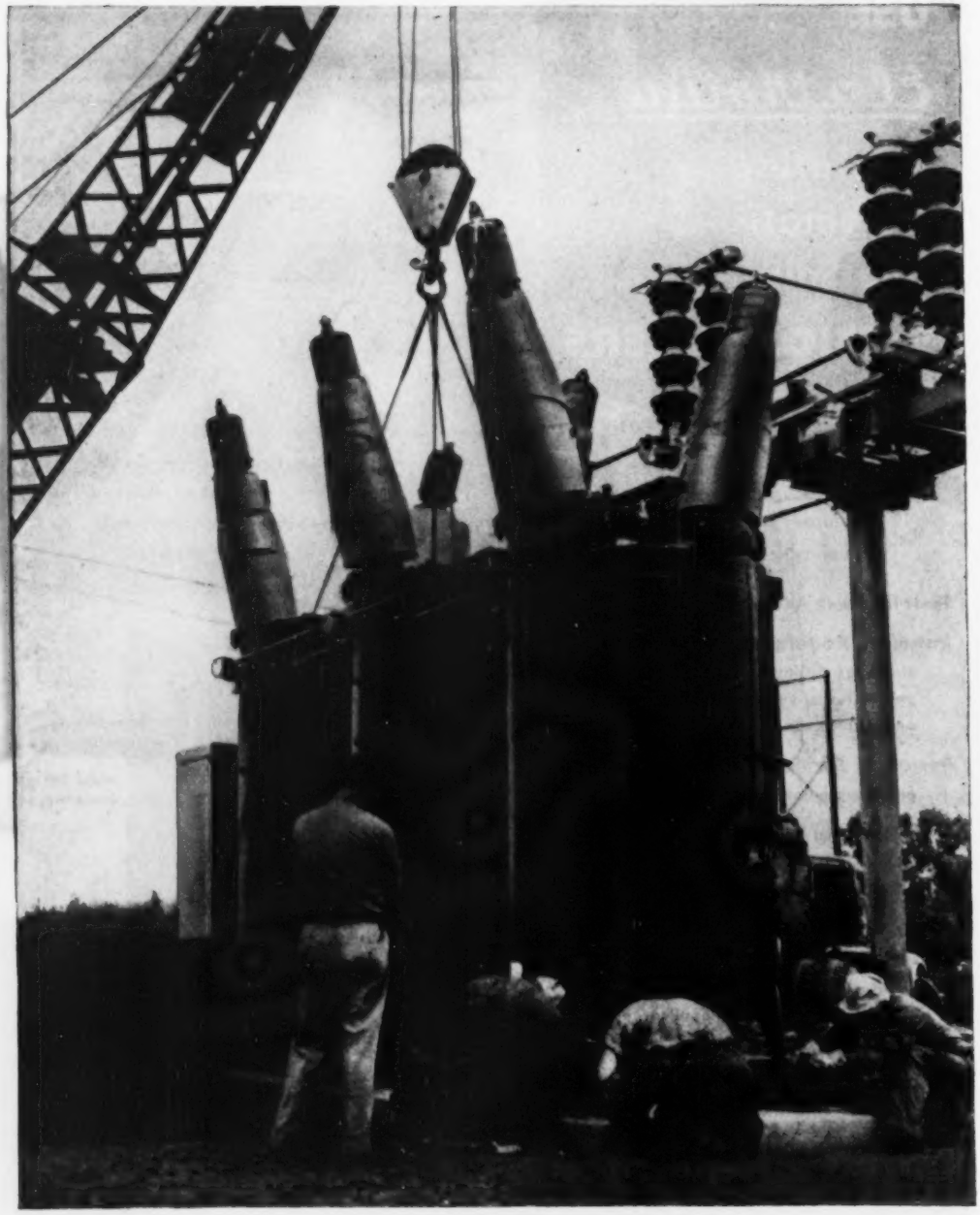
G-E oil circuit breakers protect



PROTECTION OF VITAL 100,000-KVA POWER INSTALLATION WILL BE PROVIDED BY THESE G-E TYPE FK-439 CIRCUIT BREAKERS

new industrial area's power supply

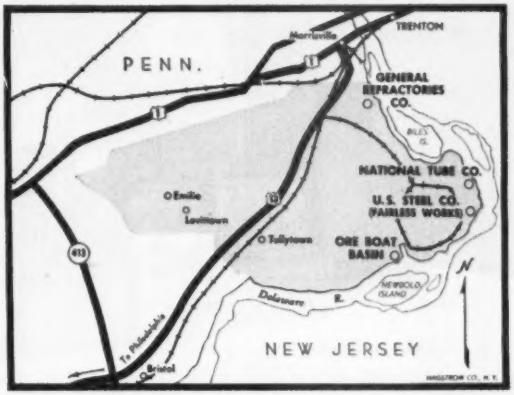
PHILADELPHIA ELECTRIC ADDS 100,000-KVA CAPACITY TO SERVE U.S. STEEL'S NEW FAIRLESS WORKS AND SURROUNDING INDUSTRIAL AREA

The tremendous development of heavy industry northeast of Philadelphia has resulted in a sharp jump in demand for electric power for new industries. Accompanying this development has been a vast housing boom, with still greater requirements for electricity.

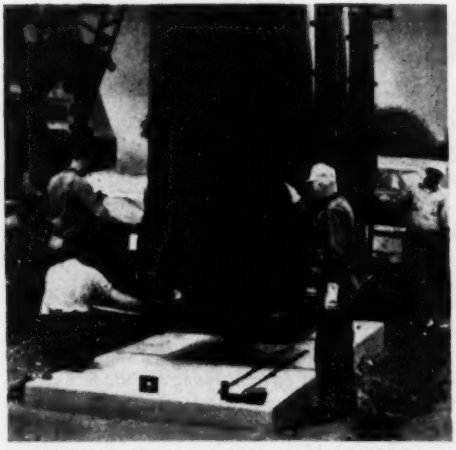
As its initial step to meet these urgent demands, Philadelphia Electric Company, has added 100,000-kva capacity through a substation located at Emilie, Pa., near the heaviest loads.

Adequate protection of this key installation was essential. To do this important job, Philadelphia Electric chose G-E Type FK-439 oil-blast circuit breakers. Minimum installation time . . . economical, high-speed performance . . . easy accessibility for inspection . . . service reliability and simplified maintenance—these are among the advantages of the G-E units selected.

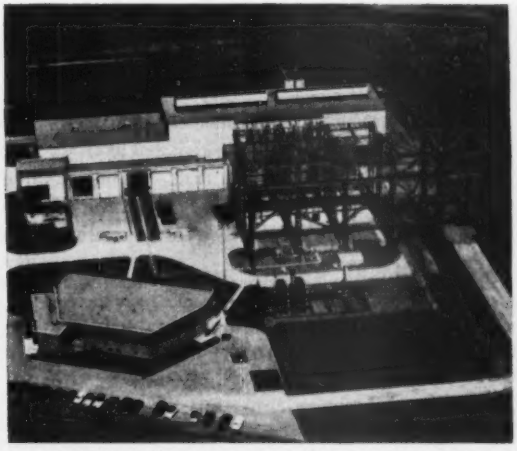
If you anticipate a need for reliable, heavy-duty (115 to 230-kv) breaker service, ask your local G-E representative about the Type FK-439 breaker. Or write for further details in Bulletin GEA-4407B, General Electric Company, Schenectady 5, N. Y.



PART OF AREA TO BE SERVED by Philadelphia Electric Company's substation at Emilie, Pa., is shown in red above. Names and locations of some of the largest new customers are also indicated. G-E Type FK-439 oil-blast circuit breakers will protect their power supply.

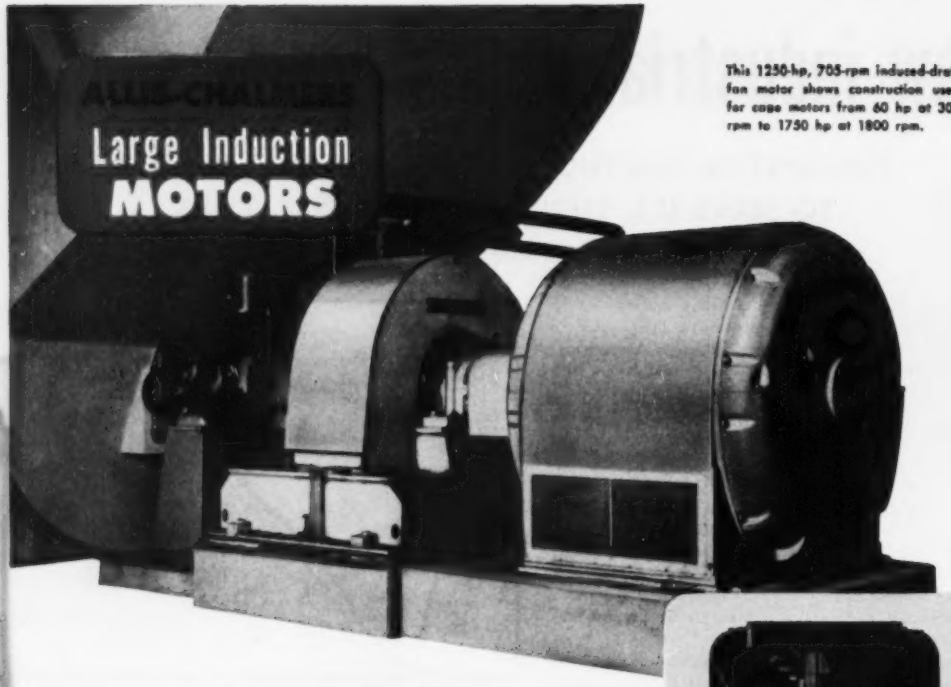


INSTALLATION TIME cut to a minimum on Philadelphia Electric job by G.E.'s Unit Base Mounting—only 35 minutes from transport trailer to foundation, ready for electrical connections. Breakers are mounted on common base of steel I-beams.



G.E.'S MULTIMILLION-KVA "FACT-FINDER." New Switchgear Development Laboratory at Philadelphia is equipped to develop and test switchgear for growing loads. Exhaustive tests are made on protective equipment such as circuit breakers at Philadelphia Electric's Emilie substation.

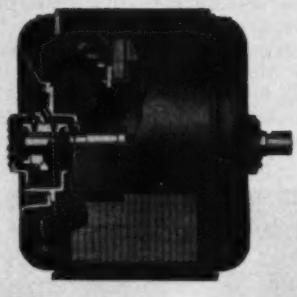
GENERAL ELECTRIC



This 1250-hp, 705-rpm induced-draft fan motor shows construction used for cage motors from 60 hp at 300 rpm to 1750 hp at 1800 rpm.

GOOD TO LOOK AT...
and Worth Looking Into

THIS MODERN Allis-Chalmers cage motor looks good in modern power plants—one glance at its clean, simple lines and smooth contours tells you that. But only a careful check of its design features can show how much it offers in all-around protection, easy accessibility, and operating dependability.



Cutaway view indicates construction features of this modern motor. For details, ask your A-C representative for Bulletin 05B7542, or write to Allis-Chalmers, Milwaukee 1, Wisconsin.

Protection begins with drip-proof construction as standard above 500 rpm. (Splash-proofing entails no change in external appearance.) In addition, louvers on air discharges and design of intakes keep foreign objects out of the motor.

Accessibility starts paying dividends during installation; large stator air discharge openings allow ample room for drilling, doweling and bolting. And they encourage cleaning of air passages back of the stator core. For cleaning or inspecting the windings, only the upper halves of the end shields need be removed — there's no need to disturb the bearings.

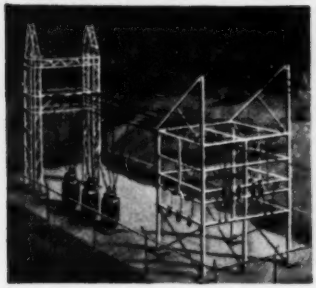
Dependability stems from rigid cast-iron end shields that assure maintenance of correct bearing alignment. Capsule-type bearing housings protect the bearings and oil supply while the motor is being cleaned. And other construction details further uphold the reputation for long-life reliability enjoyed by Allis-Chalmers motors. A-3828

ALLIS-CHALMERS

(Advertisement)

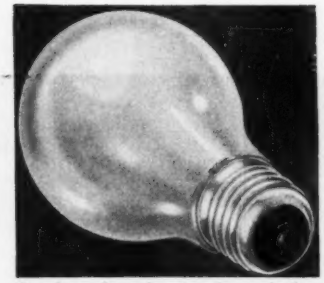
Electrical Applications of Aluminum

Savings in Substations



Important savings in erection costs and maintenance are prime reasons for the growing popularity of aluminum substations with utility companies, co-ops and large industrial users. The light weight and easy fabrication of aluminum permits faster, simpler erection. More shop assembled aluminum components mean less assembly at the job site—less skill is needed in assembly and anywhere from 3 to 7 days can be cut in erecting an average substation. No massive foundations are needed, grounding requirements are much simpler and field drilling is easier—more savings thanks to aluminum. Substation maintenance costs are kept to a minimum because aluminum requires no painting—no costly shut-downs.

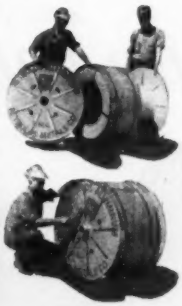
Lower Cost Light Bulb Bases



From heavy duty substations down to featherweight light bulb bases, is quite a drop but it's interesting proof that rarely there's a job too large or too small for aluminum. Small jobs can pose tough problems, too. For example, in engineering light bulb bases, it was necessary to develop sufficient rim strength with aluminum of a temper suitable for drawing and working. The method of introducing molten glass to the aluminum base had to be revised. A means of soldering conduction wires to aluminum had to be determined. All the above problems *were solved*—and *at a lower cost* than ever before. True, the savings per unit were small, but on a volume basis they added up to an important figure. Consult Reynolds Aluminum Specialists for assistance on your electrical design problems.

WITH REYNOLDS ACSR MASTER REEL and COIL

Want cost reduction proof? Then see how Reynolds Master Reel and Cable save important time, money and labor.



Reynolds all metal Master Reels sharply decrease handling, storage and bookkeeping costs. *Four Master Reels actually take the place of one hundred wooden reels!* They're easily taken apart and re-assembled around the Master Coil by linemen in the field. They're far stronger than wooden reels and can be used over and over again.

Reynolds Master Coils hold the same amount of conductor as conventional wooden reels. They are carefully waterproofed, lagged and banded for complete protection in transit and on the job.

Plan today to convert to the money-saving Reynolds Master Reel and Coil method. Sooner or later you'll use aluminum—why not now? *Reynolds Metals Company, 2584 South Third Street, Louisville 1, Ky.*

FREE... ACSR MANUAL FOR ENGINEERS CONTAINS COMPLETE INFORMATION, CHARTS AND TABLES. Please request this booklet on your business letterhead.

For Complete Information

see your Reynolds distributors listed below or write direct to Reynolds Metals Company, 2584 South Third Street, Louisville 1, Kentucky.

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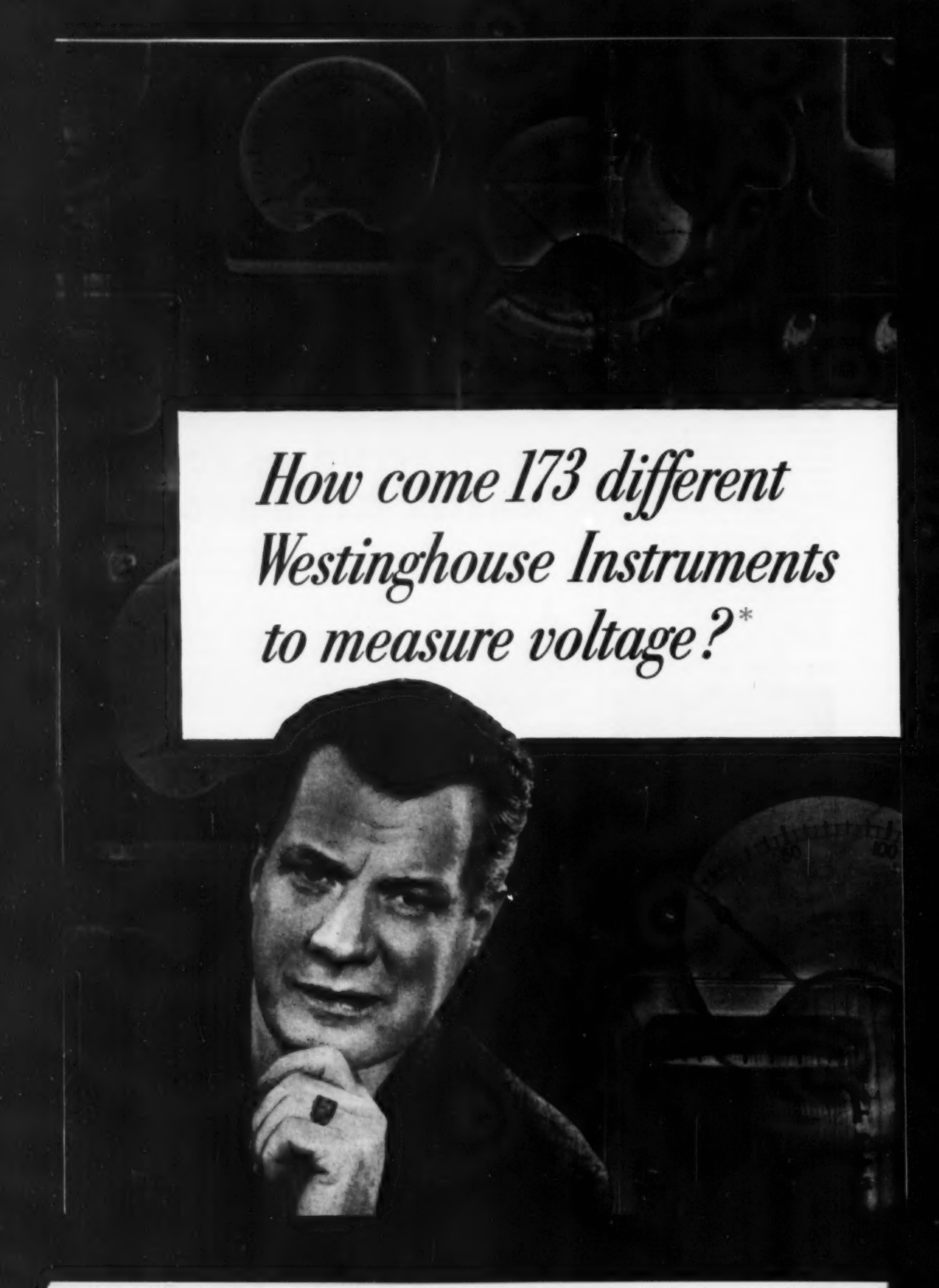
REYNOLDS ALUMINUM


How come 173 different
Westinghouse Instruments
to measure voltage?*

Because

—a wider choice of instruments offers you . . . greater latitude in product design . . . the answer to more precise control of a process . . . an opportunity to boost the efficiency of plant facilities.

the proper instrument

Whether you want to measure amperes, volts, watts, vars, frequency, power factor or synchronism—you can always get the *right* instrument when you specify Westinghouse. It's the most complete line of electrical measuring instruments in the industry! The line also includes many types to measure position, time, temperature and speed.

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For any instrument application, you want sustained accuracy . . . easy readability. Westinghouse designs are the result of over 60 years of instrument engineering aimed at giving you the ultimate in these essentials of fine instrumentation. The performance of all Westinghouse Instruments meets ASA Standards.

properly applied

You save engineering time and expense . . . gain more effective use of instruments when you have manufacturer's assistance in their application. A team of highly trained Instrument Application Engineers is available to work with you in applying all Westinghouse Instruments.

registers an advantage for you!

The experience of a large eastern manufacturer provides an example. By applying standard Westinghouse GY-40 Recording Wattmeters to predetermine load on mixers, they obtained a 15 percent saving in mixing cycle time! A typical pay-off when the proper instrument, properly engineered is properly applied! Next time, specify Westinghouse!

J-40418

The extensive coverage of Westinghouse voltage measuring instruments is further emphasized by the fact that there are 36 different instruments just to measure d-c millivolts.

For complete information about all Westinghouse Instruments, wire for Booklet B-4696. Address: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

YOU CAN BE SURE... IF IT'S

Westinghouse

INSTRUMENTS

Silver DEPOSITS

ON BUSES AND SWITCH GEAR

INDUSTRIAL BRUSH ELECTRO-PLATING

is a low-cost, efficient and practical method of applying permanent pure silver* deposits on electrical equipment.

Economy: This original Brush Plating process applies the finest plating possible. Electrodeposits are applied only where the applicator is used. Plating costs can be reduced and placed under complete control.

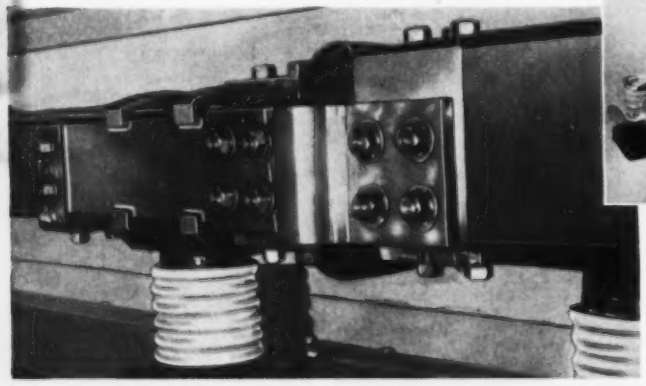
Availability: The efficient power unit and solutions are always ready for instant use—anywhere. Use it on equipment "in place" or during manufacture—No service interruptions.

Simplicity: An average worker will learn the correct method of use in less than thirty minutes.

*The electrodeposits of this process are 99.9% plus, pure silver.

- **Brush Electroplating permits rehabilitation of obsolete equipment**
- **insures positive protection to strategic metals**
- **eliminates destructive oxidation**
- **pure silver gives greater electrical conductivity**
- **helps prevent loss of power**
- **gives longer and more satisfactory performance to present electrical equipment**
- **approved and used extensively by United States Army and Navy — Industrial plants and most Power Companies**

*Also applicable for other metals, etc.



NEW LOW group price for complete outfit ready for use as illustrated, only **$215.00**, f.o.b. Chicago. Brushes are made of Nylon bristles and are unaffected by normal plating solutions. The above installation is all you need for this modern electroplating process.

AJAX-CONSOLIDATED COMPANY

Service to Utilities . . . Industry and Railroads

4621 WEST 20TH STREET . . . . . CHICAGO 50, ILLINOIS

Check List

for selecting a Piping Contractor

Listed below are a number of important factors that should be taken into account whenever you select a piping contractor. If any of these are overlooked, you are not buying your piping construction to best advantage.

☐ **EXTENSIVE SIMILAR EXPERIENCE** • Is the contractor thoroughly experienced on your type of work? Problems are always more readily solved when they have been met before.

☐ **MODERN FABRICATING PLANTS** • Fully equipped plants staffed by piping experts mean practical piping subassemblies that are correctly planned and prefabricated to simplify and expedite field erection.

☐ **PROGRESSIVE ORGANIZATION** • You want a contractor who keeps abreast of new piping developments. Piping research on a continuous basis should be his policy.

☐ **CONVENIENT LOCATION** • A fabricating plant near enough to give you quick service is of prime importance. Convenient location also improves overall supervision of the job.

☐ **SUPERIOR FIELD FACILITIES** • A job of any size needs a resident superintendent with a permanent staff of supervising erectors. Welders should be qualified on your materials.

☐ **PLUS SERVICES** • The experienced contractor often can make suggestions that result in improved piping design and savings in time and money.

4586

You can check all these when you select MIDWEST

MIDWEST PIPING SERVICE IS NATION-WIDE

4 Plants Are Better Than 1

PIPING FABRICATORS AND CONTRACTORS

MIDWEST PIPING & SUPPLY CO., INC.

Main Office: 1400 South Second Street, St. Louis 4, Mo.

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You will always win by using TIREX portable cords and cables. When you "write in" TIREX on your requisitions for portable cords and cables you vote for top-quality, long-life, and trouble-free service.

Those who buy and use TIREX tell us they like the tough TIREX neoprene armor. It provides the kind of wearability and snagproof service their operations demand. They are more than satisfied too with the smooth, dense jacket that is a product of the **cured-in-lead process** used on all TIREX cords and cables.

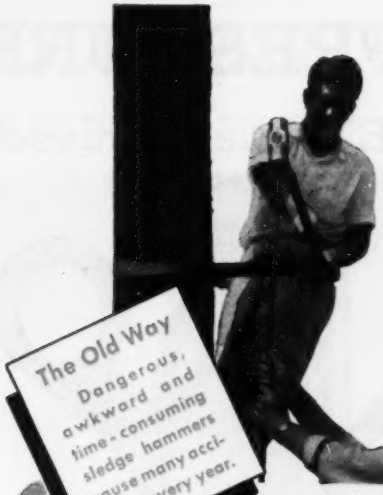
Since TIREX is oil, acid, alkali and flame resistant, it will help to curtail your maintenance costs and will postpone the day of your portable cord or cable replacement. Whenever you purchase a portable cord or cable be sure to specify and get Simplex-TIREX for economy, quality, and satisfaction. They are always marked for your protection.

TIREX is made in a wide range of sizes and types from a single-conductor #18 cord for 300 V.W.P. all the way up to 3-conductor Type SH-D cable for voltages in excess of 10,000 V.W.P.

SIMPLEX—TIREX NEOPRENE ARMOR

SIMPLEX TIREX

SIMPLEX WIRE & CABLE CO 79 SIDNEY ST. CAMBRIDGE 39, MASS



SAVE 75% OF YOUR INSTALLATION COST

Use

KEARNEY GROUND ROD DRIVER

GROUND rod driving, formerly a tedious job for two men is now safe, easy routine for one man. With the new Kearney Ground Rod Driver, *one* man can drive an 8 foot rod in *less than half the time* required by *two* men using ordinary methods.

EASY TO OPERATE

Any length rod is inserted down through the hollow handle and is gripped close to the ground by a heavy chuck. Downward blows of the handle strike the chuck and drive the rod quickly, eliminating peened-over rod ends. The workman remains in a natural standing position at all times; the chuck is moved up on the rod automatically as it is driven. Weight of the tool provides most of the driving force. Interchangeable chucks are available for all standard size rods.

SALVAGE GROUND RODS

Save money by salvaging old ground rods. Merely reverse chuck and use same action described above for driving. Removing rods is just as easy and fast as driving. Write today for catalog sheets and prices to Dept. 12.

JAMES R. KEARNEY CORPORATION

4236 CLAYTON AVE. • ST. LOUIS 10, MO.

Canadian Plant: Guelph, Ontario

Kearney Products

FOR BETTER CONSTRUCTION—SAFER MAINTENANCE

You Need HIGH PRESSURE

KEARNEY (*Field-Proved*)

FOR BETTER CONSTRUCTION and MAINTENANCE

Always Specify

KEARNEY PRODUCTS

SWITCHING EQUIPMENT

Open and Enclosed Fuse Cutouts
Reclosing Type Fuse Cutouts
Secondary Fuse Cutouts
Primary and Secondary Fuse Links
Oil Circuit Reclosers
Sectionalizer
Hook Operated Disconnect Switches
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Lightning Arresters
Street Lighting Multiple Relay

SOLDERLESS CONNECTORS

Squeezon Compression Connectors
Split Bolt Connectors
Service Connectors
Parallel Groove Clamps
Splicing Machines and Sleeves
Power Connectors

POLE LINE EQUIPMENT

Anchors
Guy Guards
Guy Wire Clips
Dead End Service Clamps
Ground Rod Clamps
Capacitors
Hot Line Clamps
Telephone Accessories
Grounding Sets
Rope

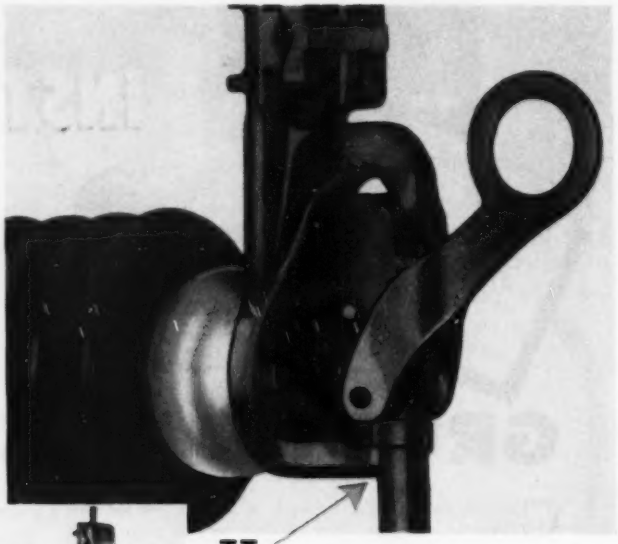
HI LINE TOOLS

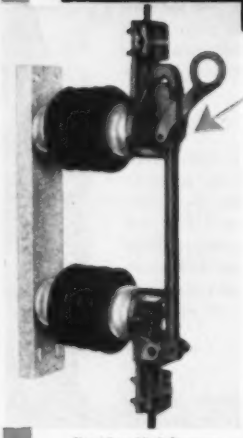
A complete line of tools and equipment for repair and maintenance of energized high voltage power lines.

Write for more information and prices to Dept. W

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. TRENTON, ONT.

The Mark of Quality Products





The Ultra High Pressure Disconnect Switch is manufactured in 6 ratings: 7,500 to 69,000 volts; 400-600 amps.

Kearney Ultra High Pressure Disconnect Switches provide contact pressures 20 times higher than ordinary hook operated disconnects. This high pressure plus silver contact inserts cut temperature rise in half!

Low operating temperature means less oxidation, reduced maintenance costs. Wide open "V" block contacts prevent galling or binding of blade.

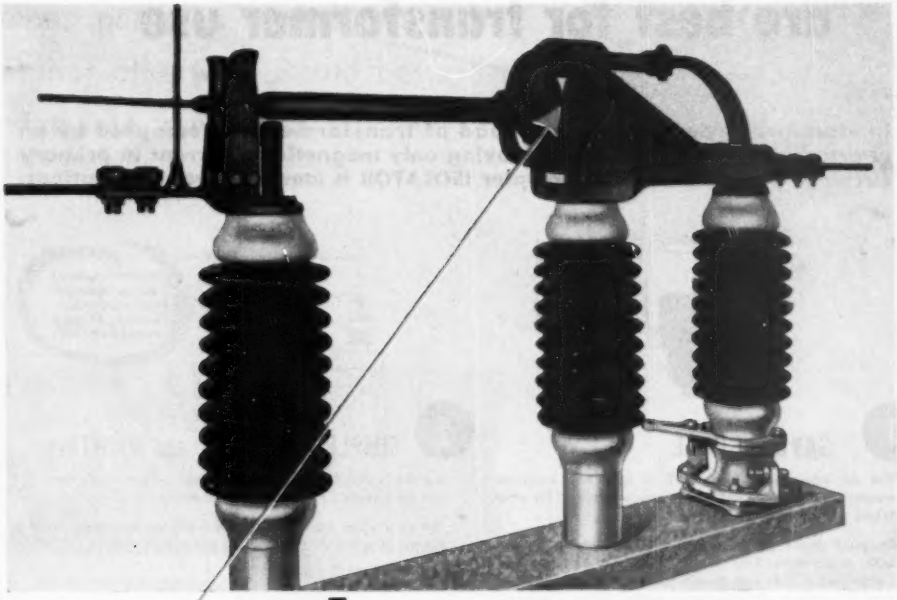
High pressure is supplied by toggle action . . . there are no springs to fatigue and wear out. Switch life is increased many times by this feature. Separate arcing areas protect main contacts against pitting. First part of the opening motion breaks the main contacts before roller snaps clear of the latch.

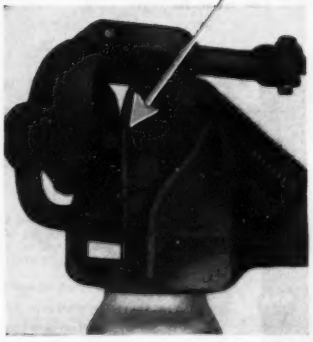
KEARNEY

JAMES R. KEARNEY CORPORATION

CONTACTS for To-day's Load

SWITCHES Carry Full Rated Current at Lower Operating Temperatures.





Kearney rotating insulator group operated switches are available in ratings to 69 KV, 400-600 amps., vertical or side break.

Look at the heavy beryllium copper contacts at each end of the blade on this ***Kearney Group Operated, Vertical Break Switch.*** Both with silver top lay, they provide a positive, high pressure current path completely through the switch without using any part of the hinge mechanism as a transfer point. This means cooler operating temperatures under full-rated load . . . and less trouble-making oxidation as a result.

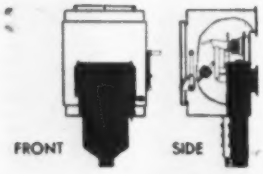
Two Oilite bearings allow free blade rotation for full wiping action while maintaining perfect alignment with both contacts. Every critical action of the switch and operating mechanism is made adjustable to synchronize phase sections and compensate for shifts in mounting structure or play in interphase rod travel

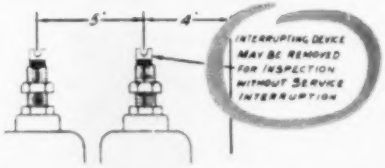
PRODUCTS

4236 CLAYTON AVE., ST. LOUIS, MO. • CANADIAN PLANT GUELPH, ONTARIO

3 good reasons why 3E AIR INTERRUPTER ISOLATORS are best for transformer use

In standard procedure normal load of transformer is interrupted by an interlocked secondary breaker leaving only magnetizing current in primary circuit to be broken. The Interrupter ISOLATOR is ideal for such applications.





1 SAVES SPACE

The Air Interrupter ISOLATOR is neat and compact, occupying only one-fourth of the space required for other types of interrupting equipment.

Diagram shows space saved by superimposing a three pole, single throw, 400 ampere, 5000 volt Air Interrupter Cable ISOLATOR, with throat for transformer mounting, over equivalent air interrupter switch. Ratio is approximately 4 to 1 in favor of ISOLATOR.

2 SIMPLE TO INSTALL and MAINTAIN

Air Interrupter ISOLATORS are lighter; consequently they can be handled more easily by construction crews.

The interrupter units can be removed for inspection by means of a hot stick without clearing the circuit.

For complete data ask for new Bulletin 138.

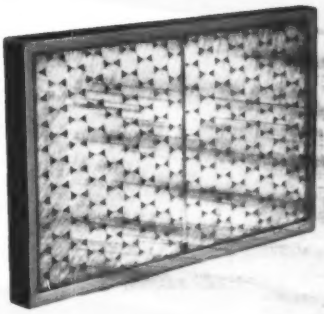
3 ECONOMY . . . 3E PERFORMANCE EQUALS COSTLIER EQUIPMENT

The Air Interrupter ISOLATOR will provide safe interruption at much less cost than interrupter switches or other approved devices. These ISOLATORS are built for loads up to 15,000 volts . . . and their cost is surprisingly low.

CABLE ISOLATOR
3 pole, single throw
400 Ampere, 15,000 volts.

American Blower . . . a time-honored name in air handling

This forced-air furnace filter catches particles of dust and dirt that otherwise would be carried into the home.



BREECHING TO INDUCED DRAFT FAN
PRIMARY CONCENTRATOR
BREECHING FROM BOILER OR AIR HEATER
SECONDARY VENT FAN
SECONDARY SEPARATOR DISCHARGES THE FLY ASH TO AN AIR TIGHT RECEPTACLE OR SEALED ASH DISPOSAL SYSTEM
NOTE: ST Precipitators are also available for stoker-fired boilers with or without a secondary system.

This American Blower Fly Ash Precipitator collects the fly ash that otherwise would settle on the surrounding area from a pulverized fuel-fired boiler in a power plant.

Both products aid materially in the American plan for better living.

AMERICAN BLOWER

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American Radiator & Standard Sanitary Corporation

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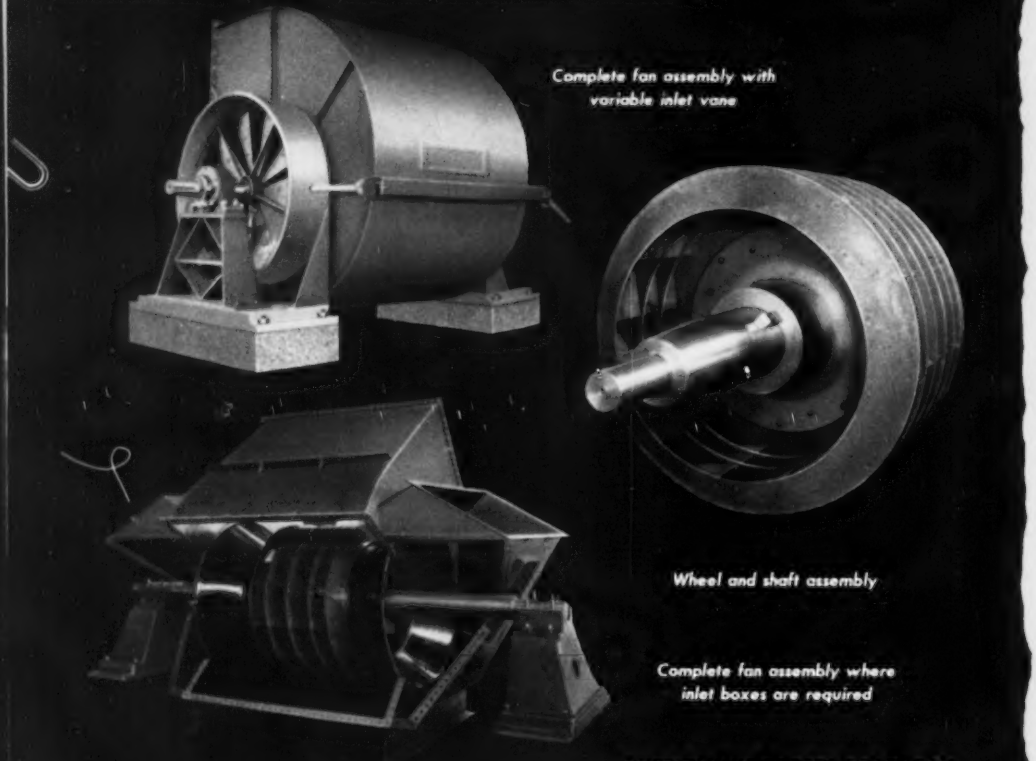
American Blower . . . a time-honored name in air handling



Complete fan assembly with variable inlet vane

Wheel and shaft assembly

Complete fan assembly where inlet boxes are required

AMERICAN HS FORCED DRAFT FAN

Memo to Power Plant Men —

You'll get high efficiency without entry loss and turbulence at a substantial power saving with non-overloading American Blower HS Fans for forced draft duty in your power plant.

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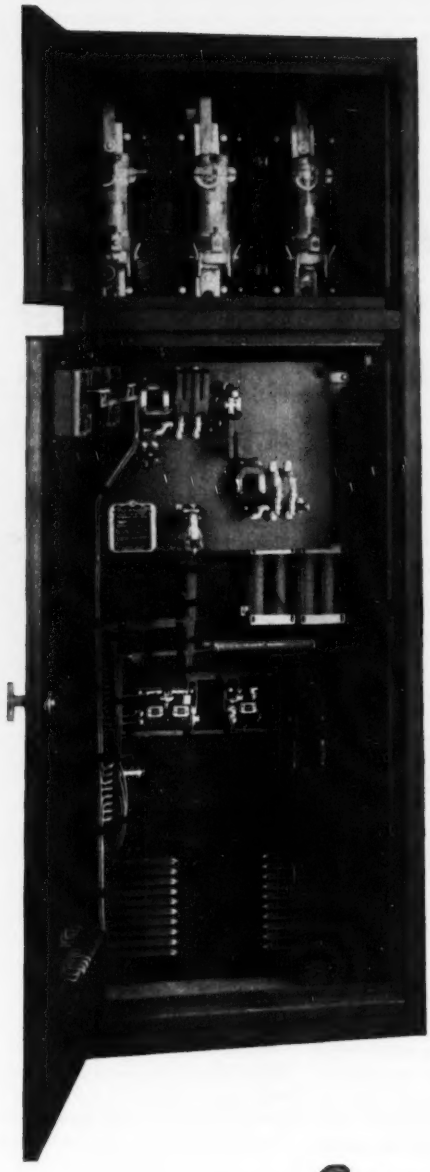


K&M Ebonized Asbestos is used for the swing-out relay panel in this Hi-Fuse Control for 400 h.p. synchronous motor manufactured by Electric Machinery Mfg. Company, Minneapolis, Minn.

When a panel mounting is K&M ebonized asbestos it's ideal for the job!

There isn't a more ideal mounting material than K&M Ebonized Asbestos. That's because K&M Ebonized Asbestos was conceived and built to do a better mounting job. It is compounded of mineral asbestos fibers and binding cement, pressure molded to high density and impregnated with a special insulating compound.

This combination of materials and processes produces a mounting material which is:

1. ***Unusually strong—both dielectrically and mechanically;***
2. ***Highly resistant to shock, vibration, and temperature changes;***
3. ***Of uniform density throughout;***
4. ***Easy to machine, cut, drill, and handle.***

K&M Ebonized Asbestos is available in sheets 42″ x 96″ from ⅛″ to 4″ thick and in sheets 48″ x 96″ in thicknesses from ¼″ to 2″. It may also be ordered cut to specific sizes, with edges beveled if desired.

We'll be glad to send you complete information on how you can benefit with K&M Ebonized Asbestos, whether you manufacture or use switchboard mountings, bus bar runs, switchgear compartment linings, test tables, bench boards, or any panel-mounted electrical equipment.

Nature made Asbestos...
Keasbey & Mattison has made it serve mankind since 1873

K&M best in asbestos

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

In Canada — ATLAS ASBESTOS CO., LTD., MONTREAL, TORONTO, WINNIPEG AND VANCOUVER

FROM DESIGN TO FINISHED ELECTRICAL CONTACT ASSEMBLY...

MALLORY Assembly Engineering

is qualified to handle all your problems

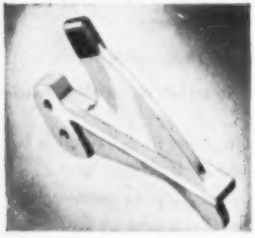
You save time, trouble and expense when you turn your electrical contact assembly problems over to Mallory.

From design and material selection . . . to parts fabrication and finishing . . . to final assembly, Mallory is qualified by its facilities, personnel and experience to handle the *whole* job for you.

Mallory takes pride in the design of more than 5000 different contacts . . . has developed many special alloys as well as new brazing and production techniques . . . has pioneered in the development and practical application of powder metallurgy . . . has designed and produced all kinds of switches.

When Mallory engineers work for you, you get better contact assembly performance . . . lowered costs . . . freedom from the problems of handling, scheduling and divided responsibility involved in assembling your own contact units.

EXPECT MORE... GET MORE FROM MALLORY



When overheating in a circuit breaker contact assembly caused premature failures, the problem was handed to Mallory assembly engineers.

They solved it through the use of a strong, copper-base Mallory alloy in the arcing blade . . . Mallory Elkonite® as the contact material . . . Mallory-developed brazing techniques. The assembly designed and produced by Mallory gave longer life . . . at a lower cost . . . and permitted the power rating of the circuit breaker to be *increased 100%*.

It is reasonable to expect that Mallory engineers can do for you what they have done for others. Call or write Mallory today.

In Canada, made and sold by Johnson Matthey & Mallory Ltd., 110 Industry St., Toronto 15, Ontari.

Electrical Contacts and Contact Assemblies

P.R.MALLORY & CO. Inc.

MALLORY

SERVING INDUSTRY WITH

Electromechanical Products—Resistors • Switches • TV Tuners • Vibrators
Electrochemical Products—Capacitors • Rectifiers • Mercury Dry Batteries
Metallurgical Products—Contacts • Special Metals • Welding Materials

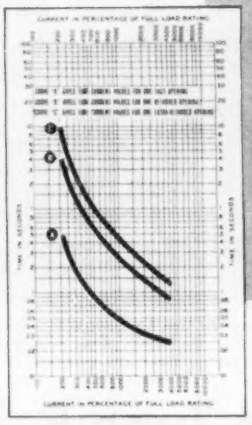
P. R. MALLORY & CO., INC., INDIANAPOLIS 6, INDIANA

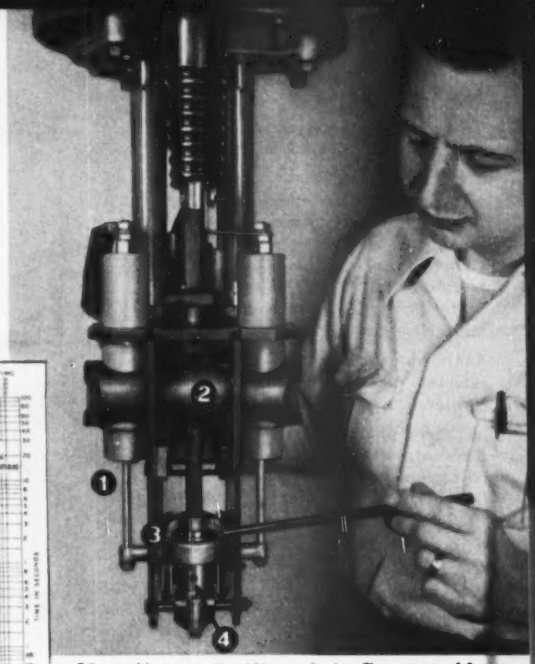
L-M's Kyle Type E 23 kv recloser outranks all others in its class for dependability, long service, low maintenance, and interrupting capacities. New higher interrupting capacity and 150 kv BIL assure ample safety factor.

"Universal" terminals for copper or aluminum conductor
Oil-filled clamp-on bushings — extremely low radio noise level
Heavy aluminum cover with operating handle, operations counter, and optional Kyle non-reclosing device lever under sleet hood
Heavy tank with welded bottom for better support, better protection
KYLE
ORTO

CHOICE OF SEVEN SEQUENCES

Only Kyle reclosers offer choice of three time-current curves and seven standard operating sequences. Curve A, fast; curve B, retarded; curve C, extra-retarded. Permits close coordination with fuses and other reclosers in series.





Oil cross blast arc extinguishing mechanism. The contacts of finest arc-resisting material (1) draw two arcs in series. Gas formed by one arc blasts the oil in the cross-blast chamber (2) across the other arc, extinguishing it instantly. The engineer points to the contact buffer mechanism (3), which permits varying contact opening speed by means of a removable plug (4). This insures best interrupting performance at both 23kv and up to 14.4 kv.

L-M's KYLE Type E 23 kv Recloser Now Interrupts up to 1750 Amperes at 23 kv

To meet heavier load requirements, interrupting capacities are increased to 2500 amperes at 14.4 kv, 1750 amperes at 23 kv. Provides full 150 kv BIL insulation, giving greater insulation safety factor with longer life. For all distribution voltages from 2.4 to 23 kv.

The heavy insulation and the improved oil cross blast method of arc extinction make the Type E an outstanding recloser for high voltage application, and provide an intermediate duty recloser up to 14.4 kv.

Oil-filled clamp-on bushings provide radio noise level well below NEMA standards. Plated Universal terminals for either copper or aluminum conductor. The recloser is available with a choice of eight coil ratings, three time-current curves, and seven tripping sequences. Coils and sequences are easily changed *in the field.*

Like all Kyle reclosers, the Type E is filled with ORTO®, L-M's oxidation-resistant transformer oil.

Get details on this exceptional recloser, which has proved so successful in service. Ask the L-M Field Engineer for copy of bulletin on the Kyle Type E, or write Line Material Co., Milwaukee 1, Wisconsin (a McGraw Electric Company division).

Type E Single Phase
Nominal Rating 23 kv, BIL 150 kv

Rating Amperes	Minimum Tripping Current Ampere	Interrupting Ratings* Symmetrical RMS Amperes at Maximum Phase to Phase Nominal Voltage of: 14.4 kv	23 kv
5	10	200	125
10	20	400	250
15	30	600	375
25	50	1000	625
35	70	1400	875
50	100	2000	1250
70	140	2500	1750
100	200	2500	1750

*Recloser interrupting ratings are based on the maximum test circuit X/R ratio of not less than 8, and the asymmetrical rating in total RMS amperes is 1.4 times the symmetrical ratings given in the table.

LINE MATERIAL
Kyle® Reclosers

COMPLETE COORDINATED AUTOMATIC PROTECTION FROM SUBSTATION TO LOAD

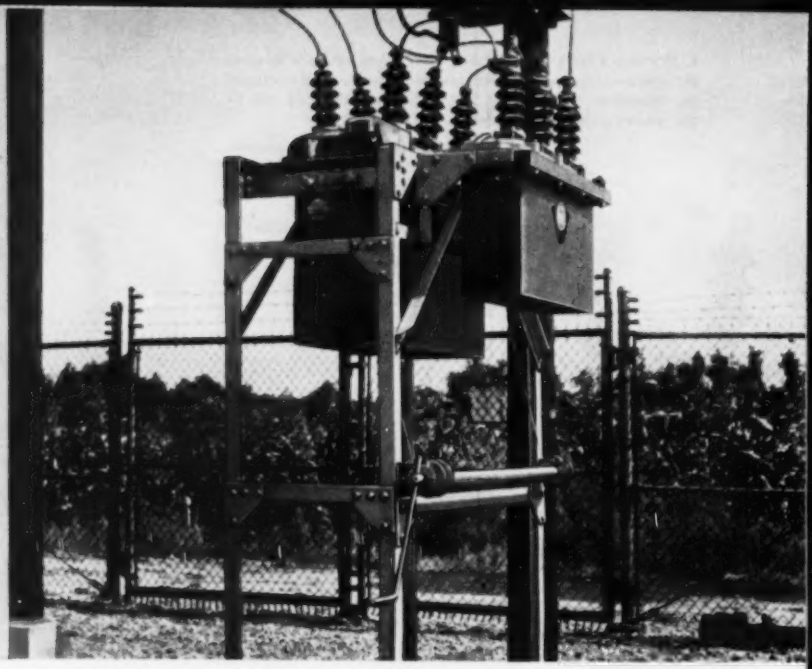
96

First 3-phase power-class recloser with 100,000 kva interrupting rating.

Completely self-contained unit provides automatic protection of substation feeders at less than half the cost of using substation breakers. Also used on feeder lines with heavy loads and high fault currents.

Available with ground trip solenoid and current transformer.

All three phases trip simultaneously when fault occurs on any one phase, preventing feedback.



The Kyle Type R Recloser at St. Joe substation of Indiana-Michigan Electric Company, Ft. Wayne. The recloser, termed the greatest recloser development since Kyle pioneered dual timing, is available with ground trip solenoid and the current transformer shown here.

Here is L-M's Kyle Type R 3-Phase Heavy-Duty Recloser

By R. C. KIRK,
Manager, Kyle Products Sales, Line Material Company

To meet the growing need for power-class protection on 3-phase lines, L-M engineers have developed a heavy-duty recloser that provides simultaneous tripping of all three phases on feeders with heavy loads and high fault currents.

This is a new and very desirable feature in heavy-duty 3-phase reclosers. It prevents high transient voltages sometimes encountered with single-phase switching on delta systems; and on wye systems it prevents feedback which might cause trouble on heavily loaded 3-phase circuits.

6000 Amperes Interrupting Rating

This recloser, known as the Kyle Type R, is a rugged, dependable unit capable of replacing breakers in substations with up to 100,000 kva fault capacity. The recloser is rated 25 to 280 amperes nominal load, trips at from 50 to 560 amperes, and interrupts up to 6000 amperes at 4.8 kv, or 4000 amperes at 14.4 kv.

Ground Fault Tripping

The Type R is available with a current transformer and ground trip solenoid that will trip the recloser at from 50 to 400 amperes.

This new Kyle Type R has been in continuous use in substation and pole line applications of several power companies for a period sufficient to substantiate design calculations and the extensive tests in the "Know House," L-M's short-circuit test laboratory.

Provides Dual Timing

Because it interrupts so much faster than breakers, the Type R permits co-ordination with fuses, eliminating unnecessary fuse blowing on temporary faults and thus substantially reducing service calls.

KYLE Type R Series Trip Coil Ratings

Nominal Load Rating Amperes	Minimum Tripping Current Amperes	Interrupting Rating* Symmetrical RMS Amperes at Maximum Phase-to-Phase Nominal Voltage of: 4.8 kv	14.4 kv
25	50	1500	1500
35	70	2100	2100
50	100	3000	3000
70	140	4200	4000
100	200	6000	4000
140	280	6000	4000
160	320	6000	4000
185	370	6000	4000
225	450	6000	4000
280	560	6000	4000

*Recloser interrupting ratings are based on the maximum test circuit X/R ratio of not less than 8, and the asymmetrical rating in total RMS amperes is 1.4 times the symmetrical ratings given in the table.

Closing Solenoid Voltage Ratings in complete range from 2.4 to 14.4 kv.

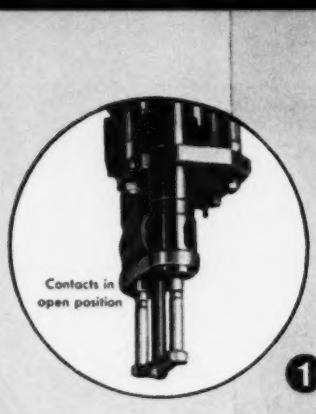
The 160 and 225 ampere ratings are available for special coordination problems. When either of these two ratings is used in series with other reclosers, minimum trip currents should have a ratio of not less than 1.32 for best coordination.

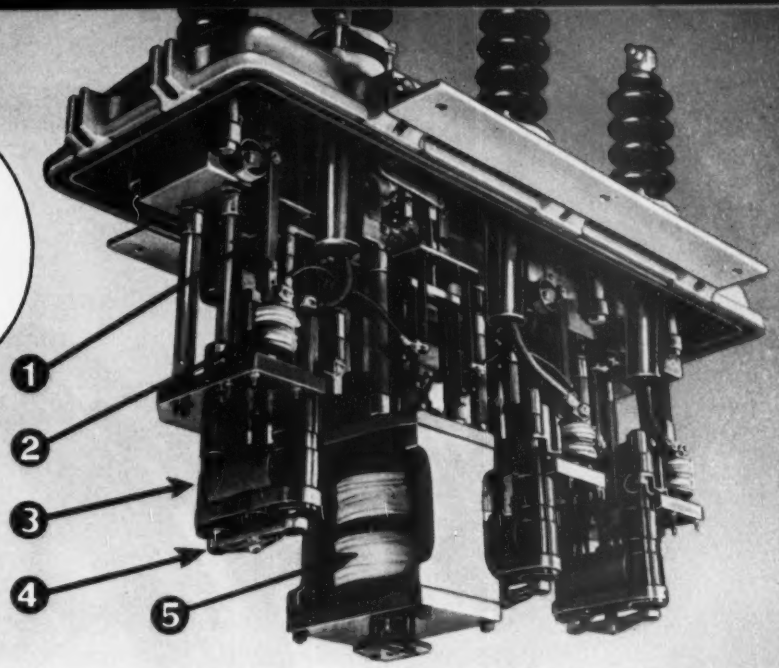
Ground Solenoid Settings: Minimum Pickup Current primary, amperes; 50; 67; 100; 133; 200; 400.

Three time-current curves; A, fast; B, retarded; C, extra-retarded. Available in any of seven sequences.

Trip coils, closing coil, and sequences easily changed in the field.

Insulation Level: full power class; meets ASA, NEMA, AIEE standards for 15 kv station equipment, as follows:
60 cycle one-minute withstand, dry: 50 kv.
60 cycle ten-second withstand, wet: 45 kv
1½ x 40 ms surge withstand (BIL): 110 kv





Open view of the completely self-contained Type R Recloser operating mechanism: 1, tripping linkage; 2, series trip solenoid; 3, oil cross blast arc extinction chamber; 4, contact structure, with contacts in closed position; 5, closing solenoid. Ground trip solenoid is on opposite side.

Applications for the Type R

Because of its operating advantages, the savings it affords in service calls, and its low cost in comparison with substation breaker equipment, this recloser will no doubt replace breakers in many cases. The low cost is possible because the Type R is a single, self-contained unit, designed, manufactured, and tested on a standardized basis, with all the economies this implies. It will also be used in many line locations where heavily loaded 3-phase feeders justify this protection.

Complete Automatic Protection

With this new unit, Line Material now offers a complete range of automatic protection, with both single-phase and 3-phase reclosers, in the entire range up to 6000 amperes interrupting rating at 4.8 kv, and 4000 amperes at 14.4 kv. Thus L-M now provides complete, coordinated automatic protection from substation to load.

DESIGN AND OPERATING FEATURES

Operation completely automatic. On permanent faults recloser opens and recloses three times, and then locks out. On temporary faults the fast openings permit the fault to clear; if it is not cleared, the time delay operation blows the sectionalizing fuse, and the recloser resets itself for another complete cycle. Type of fault—3-phase, single-phase, or phase-to-ground—does not affect the timing.

Time Delay System, located above oil level and is Silicone fluid filled.

Operating curves: A, fast; B, retarded; C, extra-retarded. Seven possible standard sequences or combinations. Sequences easily changed in the field.

Dual Contacts, with oil cross-blast arc extinction which has proved so successful on the Kyle Type L.

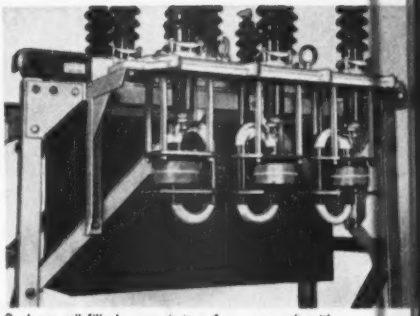
Clamp-on bushings, easily replaced; plated "Universal" terminals for both copper and aluminum, No. 6 solid to 250 MCM stranded conductor.

Kyle non-reclosing feature, for extra safety, standard equipment.

Operating handle, counter, and non-reclosing feature lever easily accessible under sleet hood. Trip-free operating handle.

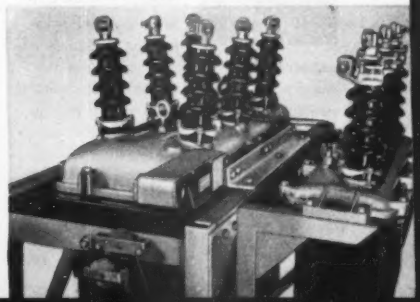
Let Us Answer Your Questions

Ask the L-M Field Engineer for a copy of Bulletin CR1C —or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



3-phase oil-filled current transformer, used with ground trip solenoid for ground fault tripping. Primaries are connected one in each phase through coaxial bushings, and secondaries are in parallel. If the three primaries have unbalanced currents, an unbalanced current will flow in the secondaries and energize the ground trip coil, which then operates the recloser in the same manner as the series trip coil.

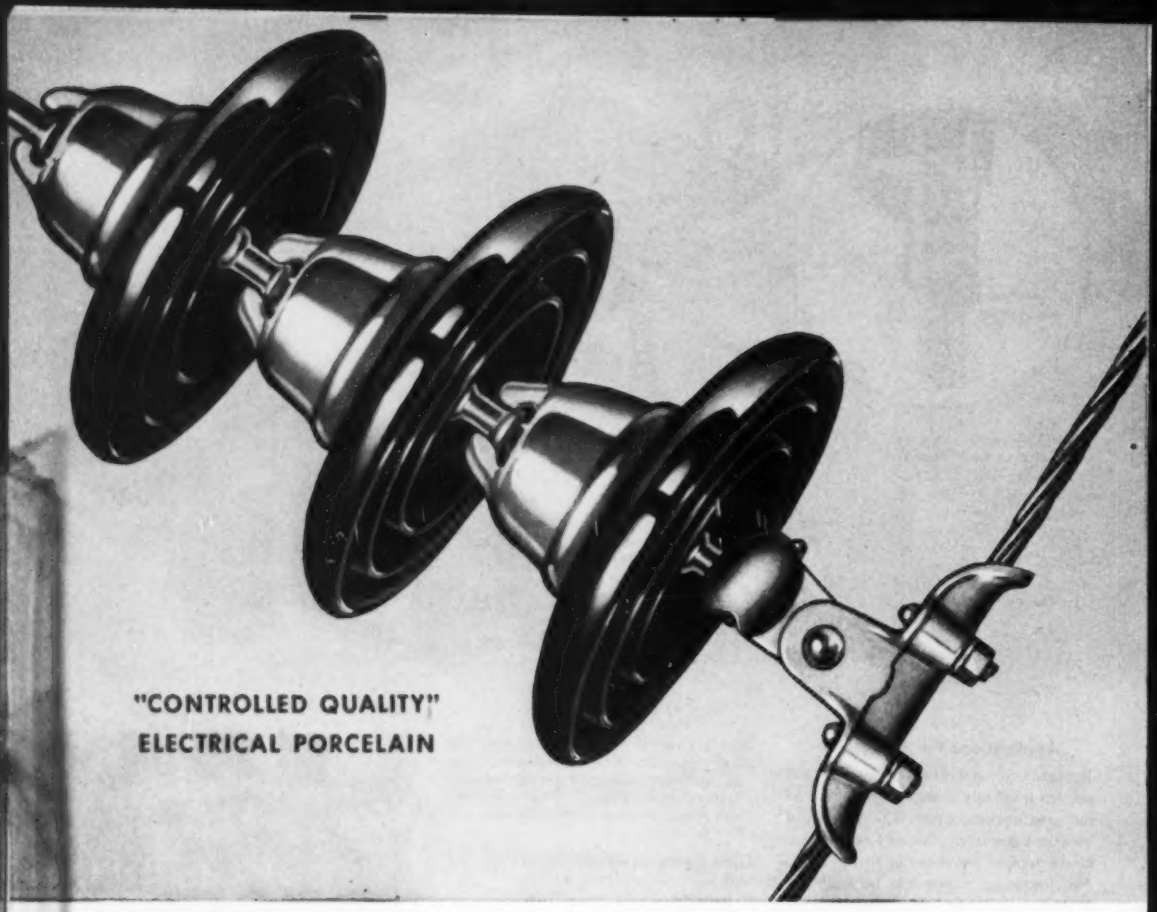
Top view of Type R recloser connected to TR transformer at right, in substation mounting frame. Both transformer and recloser are filled with ORTO®, L-M's oxidation-resistant transformer oil. Oil filler plug with ¾" standard thread, located on top of tank, has dip-stick attached.



101

LINE MATERIAL
Kyle® Reclosers

COMPLETE COORDINATED AUTOMATIC PROTECTION FROM SUBSTATION TO LOAD



How L-M Controls the Quality of J-D Porcelain Insulators

by W. V. Swan, Manager, Porcelain Sales, Line Material Company

In the early days of electrical porcelain, the making of insulators was to a great extent an art, and a craft. The skilled craftsmanship is still important, but today insulator design is a matter of precision engineering, and production is a series of carefully controlled processes, checked by extensive testing and inspection during and after production.

During many years, L-M's J-D plant has made many contributions to the progress in design and production methods, and today J-D products are widely known and recognized for their high quality.

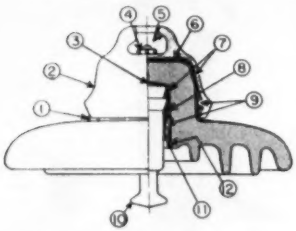
Both EEI and NEMA have set standards for acceptable porcelain products, and J-D products amply meet these standards. But to make sure that every individual unit meets these standards with a generous margin of safety, we have set up many new designs, new methods of making insulators, and new test methods. We must know that ten, twenty years from now, these insulators will still be giving dependable performance and protection.

The clays used in J-D products are carefully checked. Each batch is tested to make sure it meets our rigid requirements. Only demineralized water is used, from J-D's own wells and demineralizing system. Most of the men who make J-D products are skilled craftsmen with years of experience. But to help them develop their skills, their work is tested and retested, to assure precisely controlled, uniform production.

Because of this complete cooperation between craft and science, J-D products are outstanding in quality—in performance, in ruggedness and strength, and in their long life.

Molded or cast materials are made under close control, by highly skilled craftsmen. After the slip is poured into molds, shown here, the casting is given time to dry to the proper consistency for finishing. The time must be long enough to assure strength and firm body, short enough to permit final finishing and proper glazing.

Every strain insulator gets this "M&E" test—in which the insulator is under mechanical strain at the same time it is given a high voltage electrical flashover test. Plenty of noise and ozone here, but the results assure uniformly high quality. This is only one of the many inspections and tests given J-D products.



Some J-D Engineering Features

Cutaway view of a J-D Cap and Pin type suspension insulator shows some of the J-D engineering features that assure quality.

1. Proper clearance between edge of cap and top of porcelain shield.

2. Caps are made of high grade malleable iron, properly treated to avoid embrittlement when galvanized. Forged steel can be furnished.

3. Treated fibrous washer to provide a cushion between the end of the pin and the porcelain.

4. Spring brass cotter key.

5. Smooth socket, accurately manufactured to standard dimensions.

6. Resilient compound—applied to head of porcelain by hot dip process—serves as a cushion between bottom of cap and top of porcelain.

7. Resilient compound applied to inside surface of the cap and outside surface of the pin.

8. Sanded surfaces are coated with a layer of resilient compound.

9. Cemented joint between the hardware and the porcelain.

10. Forged steel pin—gauged accurately to standard dimensions.

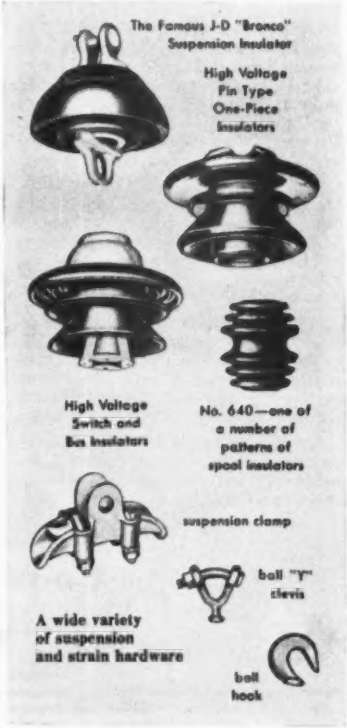
11. Sealing compound.

12. Copper oxide glaze radio treatment will be furnished if specified. J-D Suspension Insulators are recognized as having a satisfactory radio noise level without treatment.

Get Full Information

L-M offers a complete line of electrical porcelain insulators and hardware, plus engineering help in the selection of the right design to meet practically any transmission or distribution insulator problem.

For complete information ask the L-M Field Engineer who calls on you, or write M. Swan, Jeffery-DeWitt plant, Line Material Company, Kenova, West Virginia (a McGraw Electric Company Division). 94


The Famous J-D "Bronco" Suspension Insulator
High Voltage Pin Type One-Piece Insulators
High Voltage Switch and Bus Insulators
No. 640—one of a number of patterns of spool insulators
suspension clamp
ball "Y" clevis
A wide variety of suspension and strain hardware
ball hook

LM® J-D

LINE MATERIAL

Electrical Porcelain Insulators

FEATURE FOR FEATURE...

DRY CHEMICAL

C-O-TWO

FIRE EXTINGUISHERS

are your best buy!

● These fast, positive fire killers are easy to operate, compact, well-balanced and offer extensive maneuverability indoors or outdoors . . . no extra gadgets protruding or complicated operating parts. The outstanding mechanical breakage feature of C-O-TWO Dry Chemical Type Fire Extinguishers, plus continuous inert gas pressured agitation or fluffing, together with a skillfully blended free flowing dry chemical guarantee lasting, foolproof fire protection. All sizes are rechargeable on-the-scene by anyone . . . no special tools required.

C-O-TWO Dry Chemical is a finely pulverized powder . . . non-conducting, non-corrosive, non-abrasive, non-freezing and non-toxic . . . special compound consists of sodium bicarbonate and other chemicals skillfully blended to render high fire extinguishing qualities, remain free flowing while being used and withstand long periods of storage without deterioration. When brought into contact with fire, C-O-TWO Dry Chemical absorbs a greater part of the heat, decomposes and releases fire killing gases. This heat absorption process acts as an insulating screen for the fire fighter.

Fully approved and built to rigid specifications . . . C-O-TWO Dry Chemical Type Fire Extinguishers are exceedingly effective on flammable liquid, gas and electrical fires, as well as surface fires involving ordinary combustible materials . . . rated by Underwriters' Laboratories, Inc. and Factory Mutual Laboratories for class B and C fires.

Convenient 4, 20 and 30 pound hand sizes . . . no syphon tubes or valves within the cylinder to become clogged or inoperative . . . discharge hose and squeeze type discharge nozzle remain empty until actuation takes place . . . one piece removable top assembly.

Also, convenient 150 pound wheeled size . . . sturdy, wide-faced wheels . . . discharge hose and two position discharge nozzle having soft or solid stream fully enclosed in protection casing . . . footrail and dual bar handle provide easy inverting.

Act now for complete free information on these top quality fire extinguishers. Remember . . . you can't put fire off . . . fire doesn't wait. Get the facts today!

exclusive inverting design renders constant free flowing dry chemical, assuring faster, more effective and complete discharge

C-O-TWO FIRE EQUIPMENT COMPANY

NEWARK 1 • NEW JERSEY

Sales and Service in the Principal Cities of United States and Canada

Affiliated with Pyrene Manufacturing Company

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers • Dry Chemical Type Fire Extinguishers • Built-In Smoke and Heat Fire Detecting Systems
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems

WAY DOWN YONDER IN NEW ORLEANS lives our man A. B. "Cap" Caprara. In his job as one of our district managers, "Cap" services the insulator requirements of leading utilities, REA's and municipals throughout Louisiana, Mississippi, Alabama and West Florida. "Cap" estimates that during his career, which included earlier experiences in Georgia and Arkansas, he's sold over a quarter of a million Locke Pin Type insulators. These are being used by some 15 major utilities with properties in 8 southern states, 130 REA Co-ops and some 150 municipal operations. For this reason, "Cap" is in a good position to report to you on "How They're Doin'".

In New Orleans we asked "Cap" Caprara why Southern Utilities favor

LOCKE Pin Types

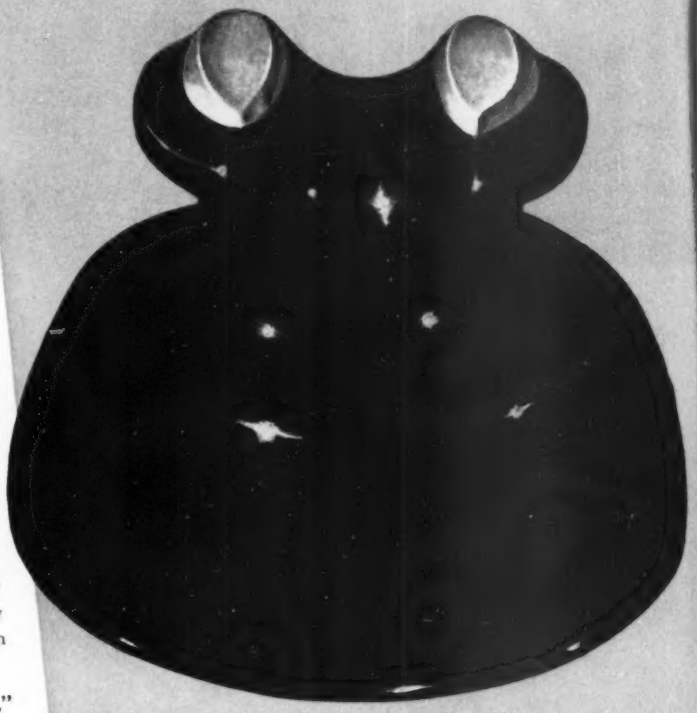
"For one thing," he said, "under lightning and switching surges they're mighty tough to puncture!"

"No puncture-causing porosity in Locke Pin Types," says Caprara, "That's because they're properly vitrified!"

"Everybody knows," says Cap, "that some kinds of lightning can puncture any insulator, regardless of who made it. Fortunately, that kind of lightning doesn't hit lines too often.

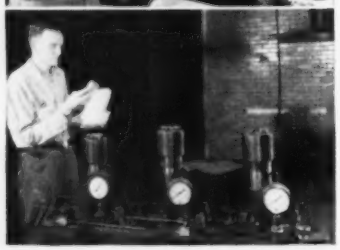
"But most any lightning surge will puncture an insulator which is not properly vitrified. That's why we take such pains at my factory," explains Cap, "to see that every Locke Pin Type is as perfectly vitrified as men and machines can make it."

"As the boys in the factory say," Cap tells his customers, "we don't let an insulator go out of here unless we're absolutely sure it's dye tight!"



On next page "Cap" shows what Locke does to assure you properly vitrified porcelain

"We triple-check," says "Cap" Caprara of New Orleans, "to make sure Locke Pin Types always reach you properly vitrified!"



WE CHECK: "Here's one of our kiln control panel boards," explains Cap. "It consists of the latest electronic equipment. We use it to control the uniformity of the kilns. This, coupled with our process control, is the first check we make to assure you *properly* vitrified porcelain."

WE DOUBLE-CHECK: "Now you're looking at what we call Pyrometric Cones. They record, pictorially, the degree of heat treatment your Locke Pin Types have received during firing. Each carload of insulators coming from the kilns is checked for proper vitrification by this method. It is the second check in our triple-check method of making sure you always get *properly* vitrified porcelain."

WE TRIPLE-CHECK: "Final proof that your Locke Pin Types have been properly vitrified," says Cap, "is the Dye Test. Here you see the equipment used to make this test, as well as one of the men who operate it. The porcelain is first coated with a dye. Then it's cracked open to see if the dye has penetrated. If not, the insulator has been *properly* vitrified. If it has, the porcelain is improperly vitrified and is rejected. Every car of insulators coming from the kiln is subjected to the Dye Test."

"Cap's" conclusion:

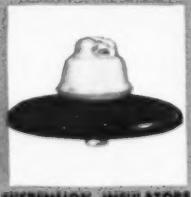
"No wonder line crews and operating engineers report that Locke Pin Types are mighty tough to puncture," observes Cap. "Look at the precautions we take to give you porcelain that is always *properly* vitrified!"

YOU ARE EQUALLY SURE of getting a masterpiece of design when you specify other products in the complete line of Locke insulators and suspension hardware. Each pays off in superior performance on transmission and distribution lines, generating stations, sub-station and electrical apparatus. Locke Department, General Electric Company, Baltimore, Md.

LOCKE

LOW VOLTAGE PIN TYPE INSULATORS

HIGH VOLTAGE PIN TYPE INSULATORS



SUSPENSION INSULATORS

SWITCH & BUS INSULATORS

SPOOL INSULATORS

BUY INSULATORS

LIQUID-FILLED BUSHINGS

SUSPENSION & STRAIN CLAMPS

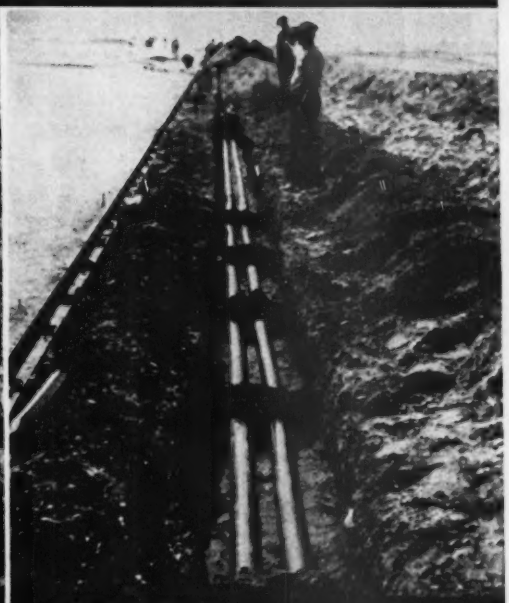
SUSPENSION HARDWARE

ENTRANCE BUSHINGS

ORANGEBURG® *Fibre* CONDUIT

STANDARD *installed with Concrete* · **NOCRETE** *installed without Concrete*

STANDARD for three or more ducts ... installed *with* concrete encasement.



NOCRETE for one or two ducts ... installed *without* concrete encasement.

ORANGEBURG
OUTSTANDING FEATURES

- Impermeable Walls — non-corrodible, resistant to acids and alkalies.
- Water-tight Taper Sleeve Joints keep out corrosive ground waters.
- Low Co-effection of Friction reduces pulling tensions on cables.
- Smooth Bore protects cables from injury when pulled in — and during movement from load.
- Lightweight 8-foot Lengths are quickly assembled—easily tooled on the job.
- Tough, Resilient — Orangeburg does not crack or break when properly laid.
- Orangeburg lays faster and at lower cost than any other type of conduit.

• When public utilities, industries and municipalities use Orangeburg Fibre Conduit year after year and in ever-increasing *quantities*, you can be sure the *quality* is *right*. You can be certain that Orangeburg gives the vital cables the unceasing underground *guardianship* they must have.

Orangeburg's outstanding features—as listed on this page —are many and impressive and account for the product's nationwide acceptance.

It is a product of low *initial* costs—with a 58-year record for permanent cable protection.

An added time and money saver is the complete line of Fittings—including angle couplings and bends—that Orangeburg makes available. Booklet on request. Write Dept. EW-10. Orangeburg Manufacturing Co., Inc., Orangeburg, New York.

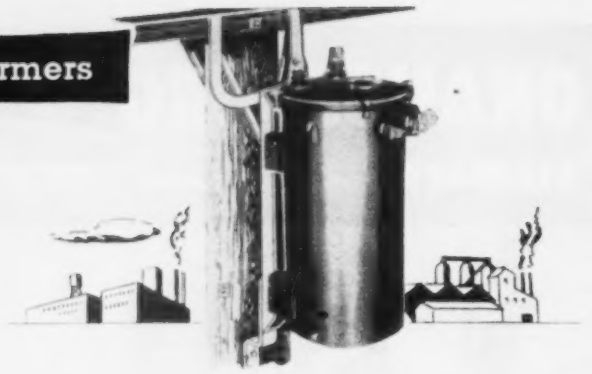
GraybaR ELECTRIC COMPANY

DISTRIBUTORS ORANGEBURG FIBRE CONDUIT

BRANCHES AND STOCKS IN PRINCIPAL CITIES

GENERAL ELECTRIC SUPPLY CORPORATION

distribution transformers



When reliability is a factor...

When a transformer is to become a vital part of a distribution system, reliability is naturally the most important factor for consideration by technical and practical-minded buyers.

To attain the highest degree of reliability in distribution transformers, The Standard Transformer Company uses but one formula . . . put the best material, engineering skill and workmanship into the transformer that is available.

When you examine a STANDARD distribution transformer at close range, the sound, basic construction and outstanding features become apparent at once. You see that the cover is easily removed and is moisture-proofed with a Neoprene gasket that prevents oil leakage; a rugged copper-bearing steel tank, housing a low-loss core assembly of non-aging, varnish coated, silicon steel sheets; a well designed core clamping that assures quiet and reliable operation. You observe many additional details that quickly convince you that STANDARD builds reliability into distribution transformers that pay off in long, trouble-free service.

You'll want to know more about STANDARD distribution transformers . . . there's a STANDARD representative near you that will give you the information you need.

Everything Points To...

WRITE FOR BULLETIN CL-50

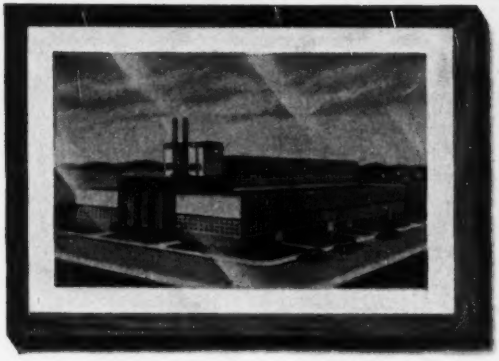
Tells the story with words and pictures of STANDARD'S complete line of transformers, and how they perform for every class of service ... on the job.

Standard

THE STANDARD TRANSFORMER COMPANY

WARREN, OHIO

REPRESENTATIVES IN PRINCIPAL CITIES



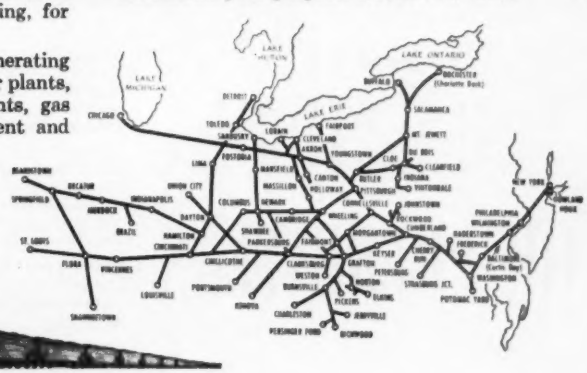
Whatever your fuel picture, *there's a B&O coal to fit it!*

• In the Baltimore & Ohio area lies a treasure-land of Bituminous—an almost inexhaustible source of low-cost heat and energy. Here are found Bituminous coals *of all varieties*—for power, for coking, for steam, for space heating.

B&O coals are excellent for generating steam in utility and industrial power plants, for steel mills, malleable iron plants, gas plants, lime and brick kilns, cement and glass plants, and potteries.

Whatever your "burning need," Industrial or Domestic, there's a B&O coal to meet it—and we are ready to help you find the best for your purpose. Just *ask our man!*

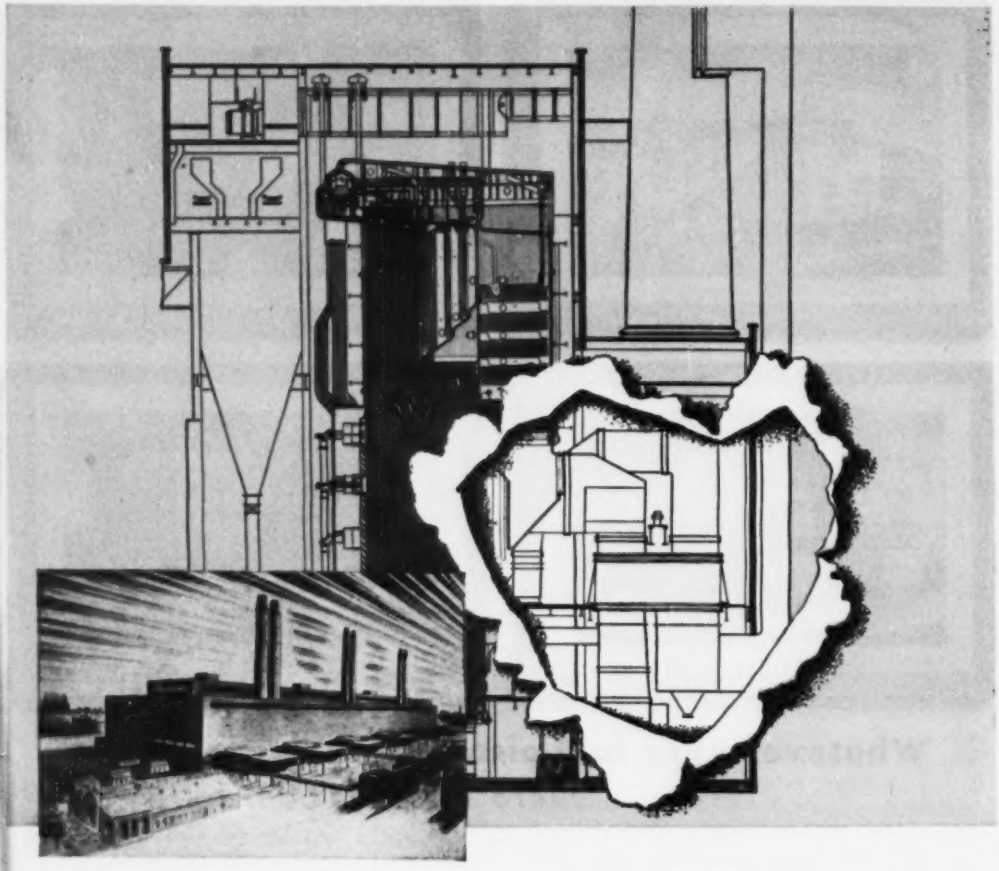
BITUMINOUS COALS
FOR EVERY PURPOSE



LINKING 13 GREAT STATES WITH THE NATION

BALTIMORE & OHIO RAILROAD

Constantly *doing things*—better!



Reheat Boilers at Astoria Station of the Consolidated Edison Co. of New York, Inc.

equipped with

LJUNGSTROM AIR PREHEATERS

As part of its immense expansion program, Consolidated Edison Company of New York will place its new Astoria Station in service in the early spring of 1953. Ultimately to have a capacity of 1,000,000 kilowatts, the station's first unit will generate 180,000 kilowatts, with a duplicate unit to follow in a few months.

Astoria Station was designed by the staff of Consolidated Edison, and is being built by various contractors. Its 160,000-kw (nameplate rating) turbine-generators each will be powered by a Babcock & Wilcox reheat boiler, rated at a continuous capacity, coal fired, of 1,200,000 pounds of steam per hour at 1850 psi and 1000 F, reheated to 1000 F.

Each boiler at this huge new station will be serviced by two Ljungstrom Air Preheaters, which will preheat incoming air to approximately 560 F, and cool exit gases to 250 F.

Once again—as is the case with millions of kilowatts of generating capacity all over the country—the Ljungstrom Air Preheater was selected for high-performance steam generating equipment. The unanimity with which the Ljungstrom has been chosen—by utilities . . . by industry . . . by consultants . . . by boiler manufacturers—for efficient steam generating units can be your guide, too, to steam generation with top fuel economy.

THE AIR PREHEATER CORPORATION, 60 East 42nd Street—New York 17, N. Y.

CRYSTAL VALVE'S *SUPER-SPEED* MEANS *SUPER-SAFETY*

Gap Structure Assures Low Impulse Sparkover

A series of small spark gaps, instead of a single large gap ... electrodes which discharge between smooth, flat surfaces ... accurately ground Steatite spacers between gap electrodes ... these are features in the Crystal Valve spark gap assembly which guarantee high speed, uniformity, reliability and efficiency.

Crystal Valve's super-speed means low sparkover or relief voltage and low internal impedance, high protection to apparatus insulation. Ventilated spark gap types prevent corrosion, glass body types make gap inspection easy.

Install Crystal Valve Arresters on every transformer for fullest protection and year-round dependability.

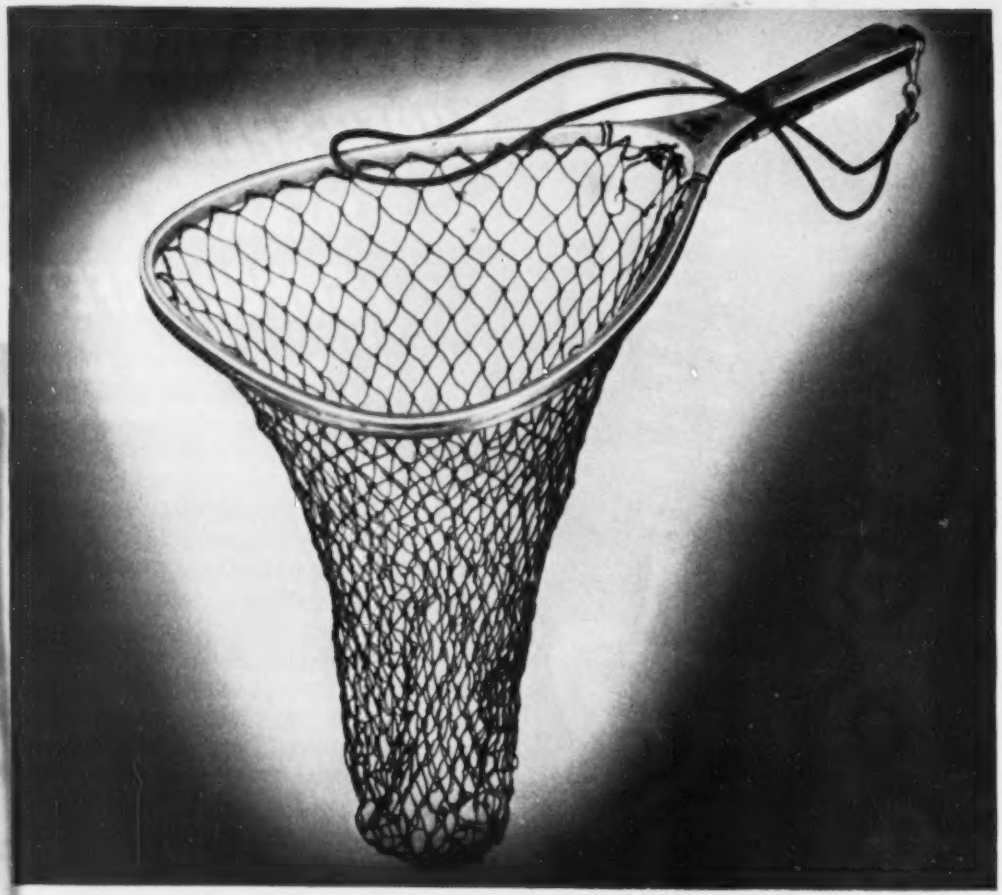
Write today for latest data on lightning arresters and their installation. Ask for CV catalog

CRYSTAL VALVE

LIGHTNING ARRESTERS

ELECTRIC SERVICE MANUFACTURING CO., PHILADELPHIA 32, PA.

Represented in Canada by Lyman Tube and Bearing, Ltd., Montreal and Toronto



Big Net!

YOU'LL HAVE TO FISH A LOT to find a better method than commercial electric cooking for catching new utility profits.

Offering a big net return of 13% on each dollar invested (according to a survey by William S. Leffler Engineers, Associated) —commercial cooking permits many utilities to meet their normal allowable rate while leaving substantial sums for reinvestment in cooking promotion—a never ending profit circle!

You will also be interested to know that commercial cooking offers the highest rate of return to electric utilities per dollar of customer investment of any type of commercial equipment!

You can get a line on this profitable load builder, too. Hotpoint, the biggest name in commercial electric cooking equipment for over 40 years, can show you how . . . quickly, easily!

Won't you write me a letter expressing your interest?

Just address it to: Orrin E. Wolf, Vice President, Hotpoint Co. —Commercial Equipment Department—265 So. Seeley Ave., Chicago 12, Illinois.

Hotpoint

HOTPOINT CO., A DIVISION OF GENERAL ELECTRIC COMPANY

FIRST IN COMMERCIAL COOKING

...the load builder to get a line on!

CHECK MOLONEY HiperCore* TRANSFORMERS

against the field for Lighter Weight, Smaller Size, Operating Advantages

CHECK THESE WEIGHTS

3 Kva LL Conventional HiperCore Transformer including oil . 120 lbs.

3 Kva CSP Class A HiperCore Transformer including oil . 140 lbs.

3 Kva CSP Class A HiperCore Transformer including oil . 155 lbs.

Easier to install — easier to store — less maintenance

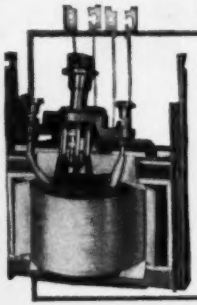
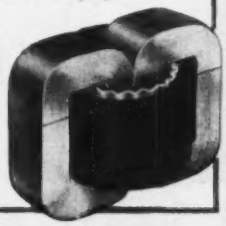
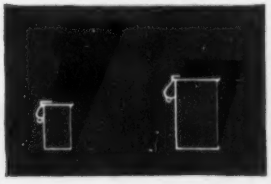


Illustration shows core-and-coil assembly. Cores are wound, annealed and impregnated, then cut into pairs of U-shaped pieces. Matching U-shaped pieces are then placed in position around the coil to complete the magnetic circuit. Core faces are cemented together. Steel bands are used to obtain tight joints.



15% TO 30% LIGHTER

because the cold rolled high permeability, oriented silicon core steel has 50% to 35% higher flux carrying capacity. This makes possible the use of smaller cores and windings. Easier to handle and install than transformers having cores of hot rolled steel, these smaller and lighter transformers take up less space on the pole, in the storeroom and on the line truck.

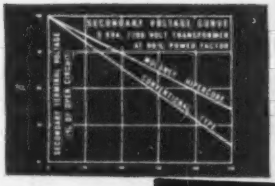


GREATER SHORT-TIME OVERLOAD CAPACITY

Moloney HiperCore Transformers have improved short-time overload characteristics which provide better peak load performance and longer life. Reduced coil mass, achieved through use of oriented steel cores, together with the extensive use of cooling ducts, results in more rapid cooling of the windings and in a lower hottest-spot temperature gradient.

BETTER VOLTAGE REGULATION

The smaller cores of HiperCore Transformers make possible windings having lower impedance. Lower impedance provides lower internal voltage drop at all loads. This is especially important during peak load periods, since HiperCore Transformers can carry higher overloads than older types, at the same permissible regulation.

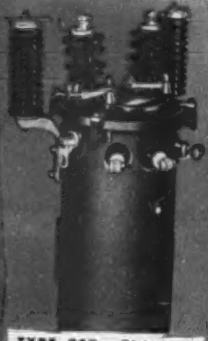


WRITE FOR BULLETIN H-305

M693-28

TYPE LL — Conventional **HiperCore** Transformer manufactured in standard sizes from 3 to 100 Kva in all standard voltages below 5000 volts.

TYPE CSP — CLASS A HiperCore Transformer manufactured in standard sizes from 3 to 100 Kva in all standard voltage ratings of 5000 volts and below.



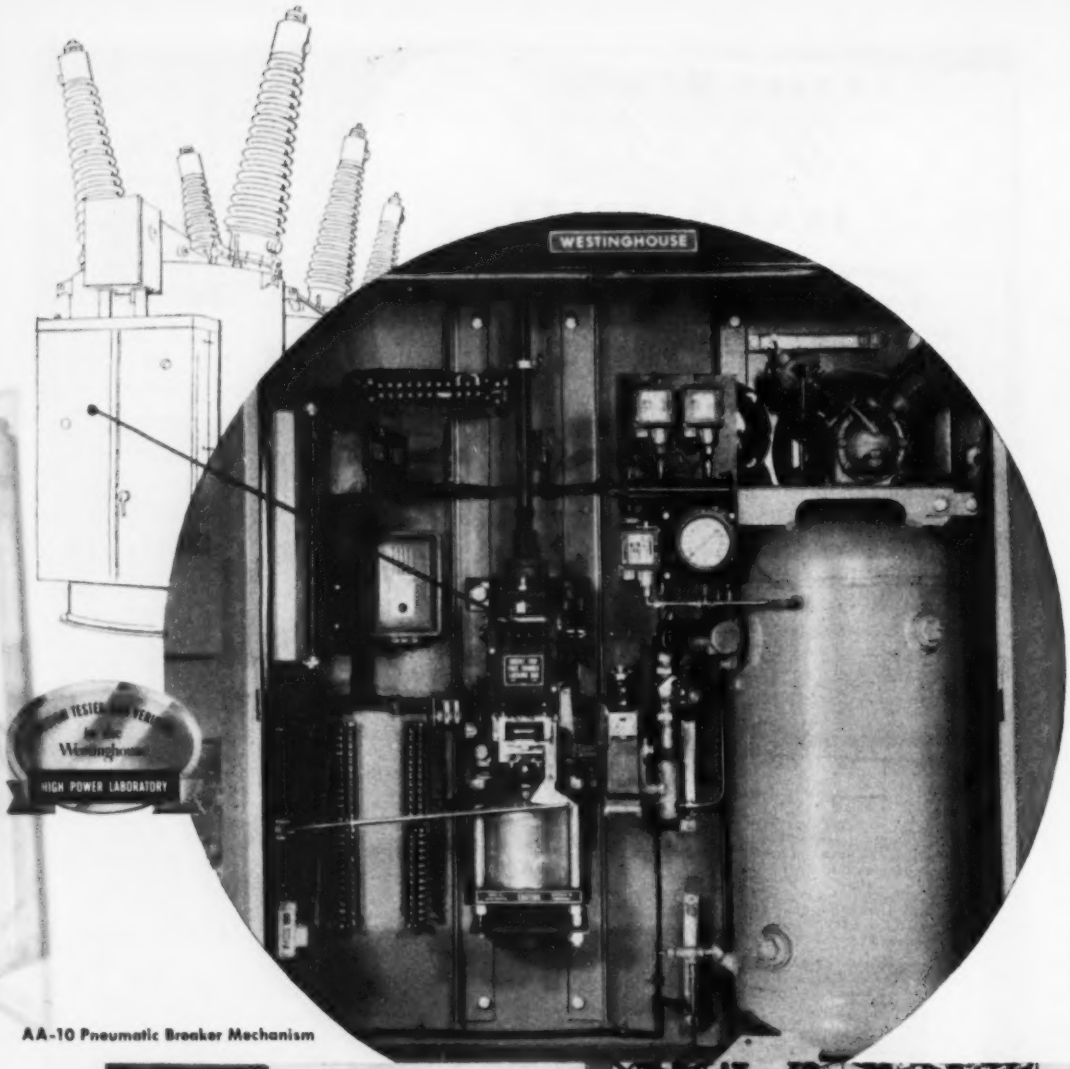
TYPE CSP — CLASS A HiperCore Transformer manufactured in standard sizes from 3 to 100 Kva in all standard voltage ratings above 5000 volts.

MOLONEY ELECTRIC COMPANY

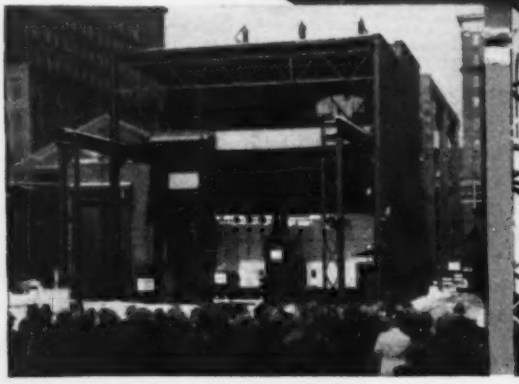
Sales offices in all Principal Cities

FACTORIES AT ST. LOUIS, MO. AND TORONTO, ONT., CANADA

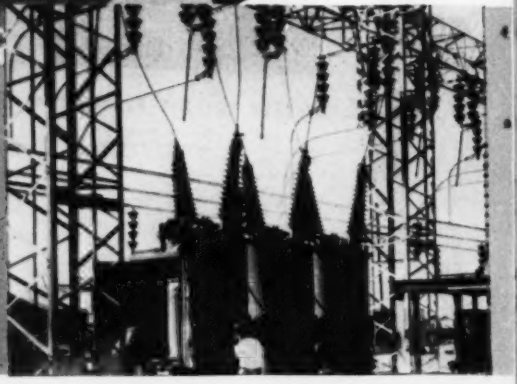
MOLONEY ELECTRIC = { BETTER PERFORMANCE / GREATER RELIABILITY / LESS MAINTENANCE



AA-10 Pneumatic Breaker Mechanism



These breaker mechanisms, like every advance in Westinghouse apparatus design, have been proved in exhaustive tests in the Westinghouse High Power Laboratory.



This 10,000,000-kva, 161-kv, 3-cycle breaker is equipped with an AA-10 pneumatic mechanism, and arranged for 20-30-30 cycle multiple reclosing.

New Breaker Operating Mechanisms Combine High Speed Reclosing...and Mechanically Trip-Free Opening

Two pneumatic operating mechanisms—the AA-7 and AA-10—now handle the complete range of Westinghouse Oil Circuit Breakers, from 15 kv, 500,000 kva to 230 kv, 15,000,000 kva. They provide new standards of operation.

THE AA-10 MECHANISM IS . . .

Larger . . . more powerful to meet the closing requirements of today's highest rated breakers.

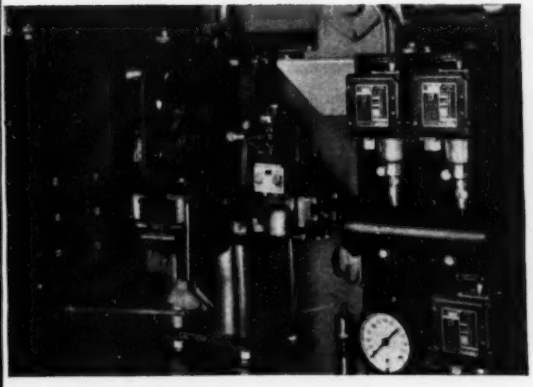
Selective . . . It trips mechanically trip-free whenever there is high-pressure air in the closing cylinder . . . contacts open unrestrained . . . never a drag from the closing piston. For high-speed reclosing, the mechanism trips non-trip-free . . . opens only part way and quickly recloses, greatly reducing stress on both the mechanism and breaker.

Unlimited Reclosing Possibilities . . . High-speed reclosing in 20 cycles, or . . . ultra-high-speed reclosing in 15 cycles or less, or . . . multiple high-speed reclosures.

THE AA-7 MECHANISM . . . Mechanically trip-free for all operations . . . meets the closing requirements of moderately loaded breakers and provides 20-cycle reclosing even after mechanically trip-free opening.

Proved Operation

Exhaustive tests in the Westinghouse High Power Laboratory and field experience on the largest breakers in service today are your assurance of perfect mechanism performance. For complete details, ask for Bulletin DB 33-125. Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.



The AA-7 mechanism, like the AA-10, features roller-bearing latches, no adjustments, simplified air control, unrestricted access to all components.

See "Electrical Proving Ground"

The dramatic story of the Westinghouse High Power Laboratory in sound and color motion picture. For details see your Westinghouse representative, or write Westinghouse Film Division, P. O. Box 868, Pittsburgh 30, Pa. J-60782

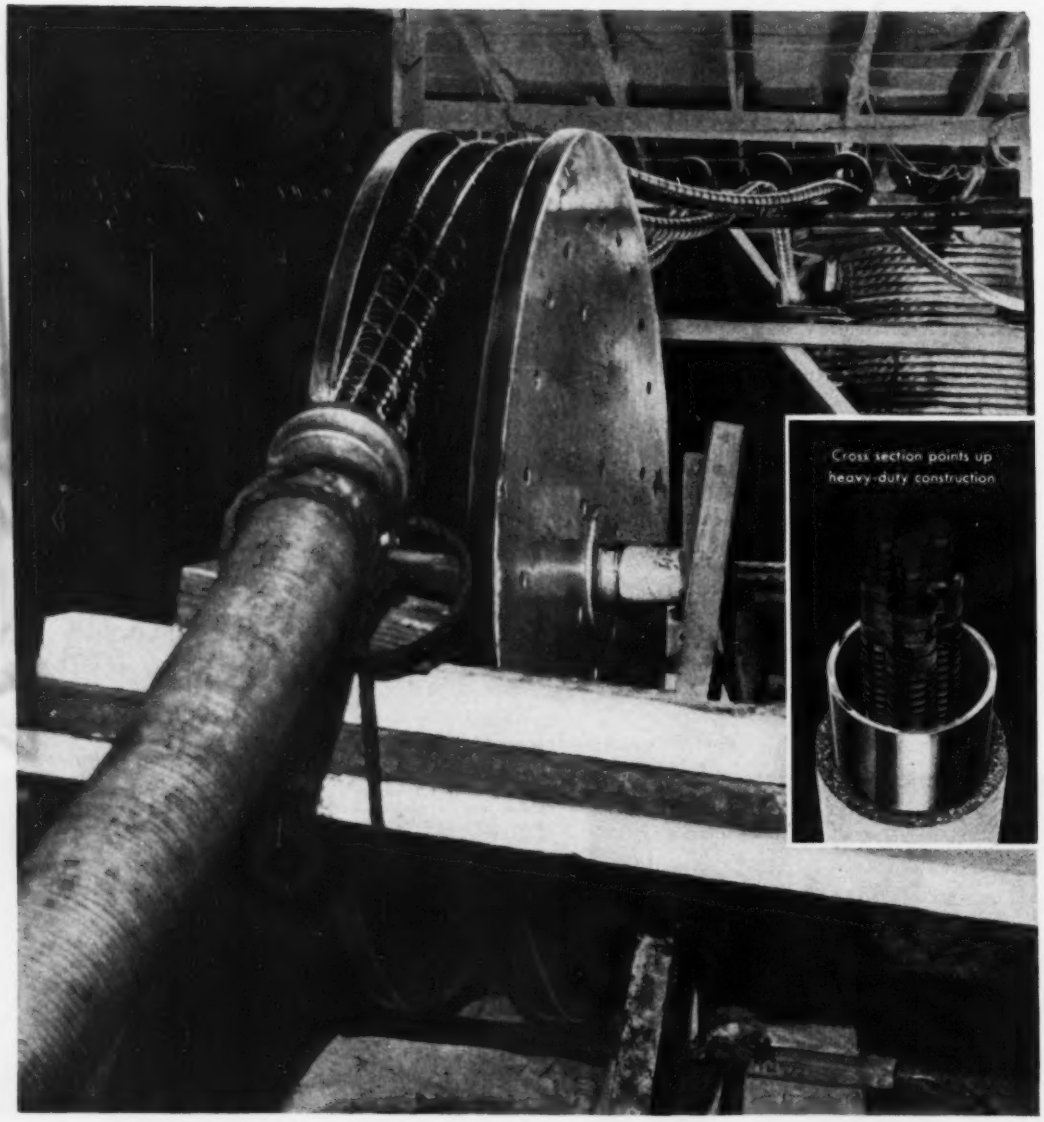
ELECTRICAL PROVING GROUND

YOU CAN BE SURE.. IF IT'S Westinghouse

POWER CIRCUIT BREAKERS

LONGEST LENGTH

6800-ft. Compression Cables without Splices



● Actual cable pulling operation shows how all three conductors are pulled simultaneously. Each reel was specially made to hold entire 6800-foot length.

138,000 VOLT CABLE

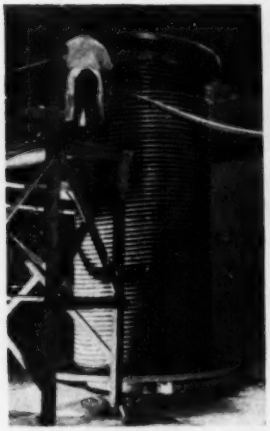
built by Phelps Dodge for service under N.Y. Harbor

Consolidated Edison's unusual underwater installation uses record-length conductors for two pipe-type feeders, each consisting of three 1,500,000-cm compression cables, between Brooklyn and Staten Island.

As a result of years of pioneering research and experience in handling the "tough" jobs, Phelps Dodge was in a position to manufacture the special underwater cables needed to integrate Con Edison's new Staten Island affiliate with its main system.

For both economy and ease of its installation, Con Edison wanted each cable made in a continuous 6800-ft. length—longest ever specified. At present the cables will operate at 27 kv, but are designed for ultimate operation at 138 kv.

Waterproof, polyethylene sheath was used to give the insulation extra protection from moisture and damage during shipment and installation. This was important because it was expected that the cables might be exposed for a considerable time during the long pull into the pipes buried in the Narrows at the entrance to New York Harbor. The sheath also provides for additional safety if, at any time after installation, the pipes were to be damaged and water find its way into the pipes.



● Part of manufacturing process shows king-size spool needed to impregnate this long length.

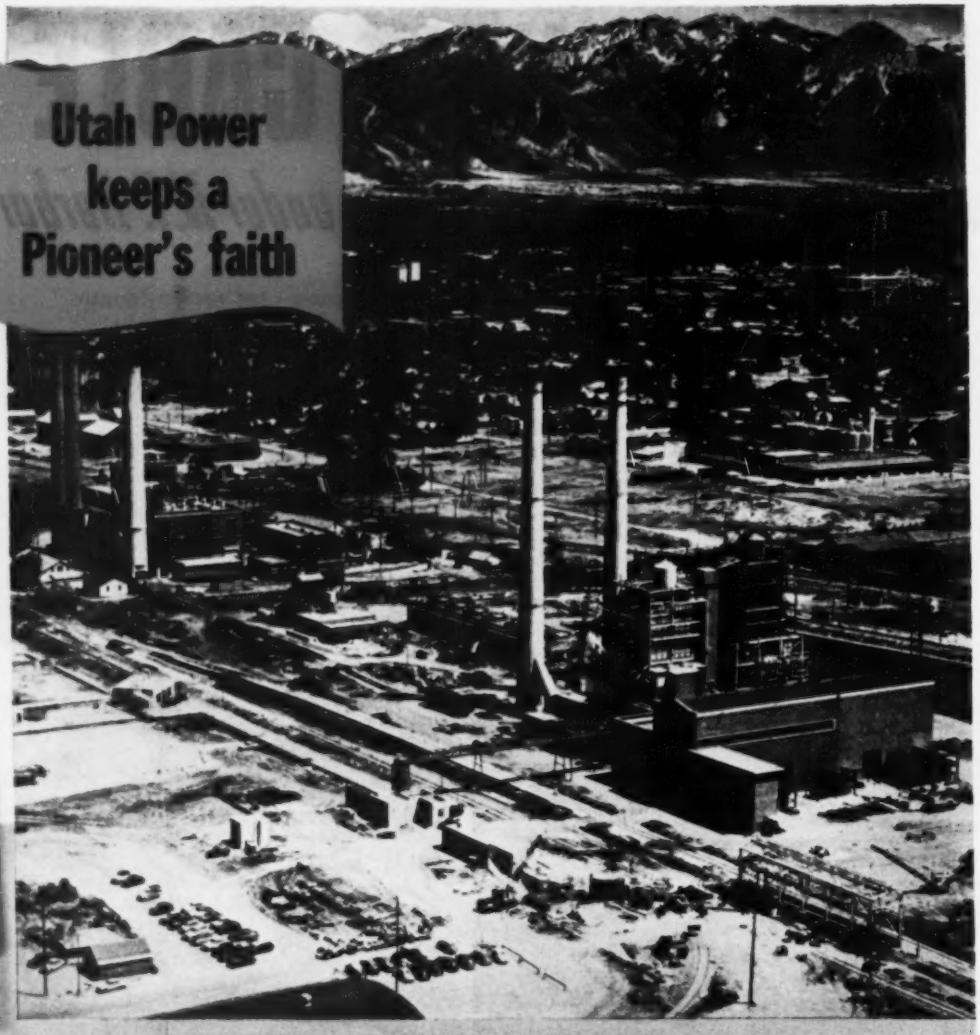
● At every step of manufacture extreme care is taken to keep cable clean and well protected.

● 700-ft. sections of pipe on Staten Island shore—ready to be welded together and pulled across the channel.

● Heavy truck tires guide pipe into water. Metal pontoons reduce drag of pipe along channel bottom.

PHELPS DODGE COPPER PRODUCTS CORPORATION

Utah Power keeps a Pioneer's faith



"THIS IS THE PLACE"... The historic words spoken by Brigham Young 100 years ago are abundantly realized in the great and growing Intermountain Empire of today. A leader in area development, the Utah Power & Light Company is providing the new power-generating capacity so essential to progress.

Before completion of the first section of its Gadsby Steam-electric Plant at Salt Lake City, plans were approved and construction authorized for an expansion to 141,000 k.w., more than doubling initial capacity.

Both units are Bechtel-designed and built. The second contract adds another to the many "repeat orders" received from leading power companies.

BECHTEL

BUILDERS FOR INDUSTRY

BECHTEL CORPORATION

Los Angeles • **SAN FRANCISCO** • *New York*

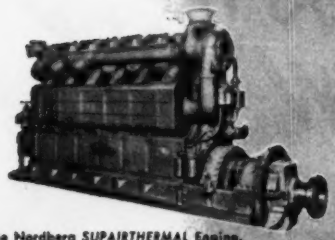
FOR THE BEST SOLUTION TO YOUR POWER PROBLEMS...

LOOK TO NORDBERG

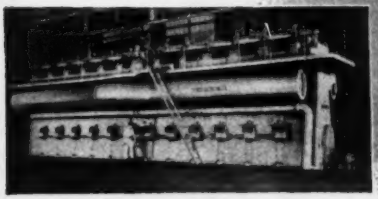
—builders of America's largest line of

HEAVY DUTY DIESEL ENGINES—

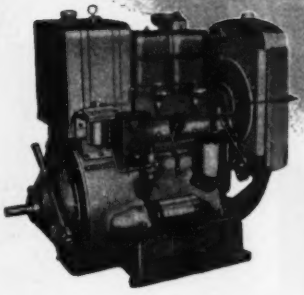
10 TO 10,000 HORSEPOWER



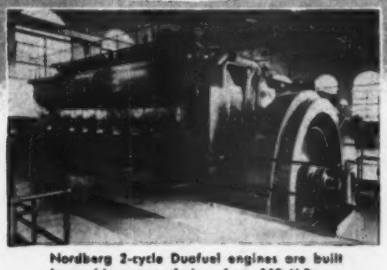
The Nordberg *SUPAIRTHERMAL* Engine, the latest development in the Diesel field, is available in a complete range of 4-cycle types for all applications, in sizes from 425 to 3200 H.P.—including Diesel, Duafuel, or spark fired gas operation.



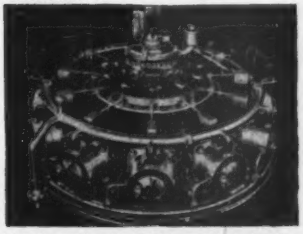
Nordberg 2-cycle Diesels for marine or stationary service are built in a wide range of types and sizes, from 880 to 10,000 H.P.



Nordberg "Packaged" Diesel Power Units—from 10 to 45 H.P., 9 to 30 K.W., for generating electricity, pumping, and straight power applications.



Nordberg 2-cycle Duafuel engines are built in a wide range of sizes from 880 H.P. upward—all of which burn oil, gas, or any combination of both — and are instantaneously convertible from one fuel to another, under full load.



Nordberg 2-cycle Radial engines develop 2125 H.P. or 1500 K.W. at 400 R.P.M. Available as an oil burning Diesel, as a natural gas engine, and as a Duafuel engine.

IN the complete line of Nordberg two and four-cycle oil burning and Duafuel Diesels and gas burning engines, you will find the right size and type of unit to meet your power requirements.

From the smallest to the largest engine, every Nordberg unit is built to deliver low-cost, dependable power . . . and the basic dependability of Nordberg engines has been amply proved in service on hundreds of successful stationary and marine power applications all over the world.

If you're planning on adding to your present power capacity, or providing new power facilities, it will pay you to investigate the long life and dependable service you get with Nordberg Engines. Write for further details, outlining your power requirements.

NORDBERG MFG. CO., Milwaukee, Wisconsin

7-SHM13

BUSCH-SULZER

NORDBERG

DIESEL ENGINES

Facts from
NEW YORK

"'CSP' Transformers save us $16,000 a year"

"92% fewer outages . . . savings of approximately $16,000 a year . . . that's the record of 'CSP' Transformers compared with conventional types of transformers on our lines," says a leading utility in New York State.

"Records recently completed, covering a period of years, show that burnouts from lightning took 0.784% of the installed capacity of conventional transformers, compared with 0.062% for the 'CSP' Transformers on our system."

Installation and maintenance costs for Westinghouse "CSP" (Completely Self-Protecting) Transformers are always lower, because complete protective equipment is built in, not separately mounted. A two-year survey of Electric Light and Power Companies shows the following:

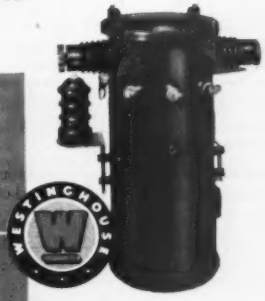
NATIONAL AVERAGES

	"CSP"	Conventional
Installation Costs	$13.87	$24.74
Burn-out Rate	0.257%	1.005%
Fuse Outages	None	5.64% @ $6.52 per outage
Load Checks	Automatic	12.8%
Breaker Reset	1.02%	None

If you'd like to check your own costs against these national averages, ask your Westinghouse representative for Booklet 4247-E, "Transformer Costs and Their Relation to Profits". Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

"CSP" devices . . . originated and patented by Westinghouse

YOU CAN BE SURE... IF IT'S
Westinghouse
"CSP" DISTRIBUTION TRANSFORMERS



J-70592

Do special problems throw your staff off balance?

Special problems are sure to arise in your business, demanding extra effort from your key executives. Added to their regular duties, this puts an undue strain on them—perhaps even lowers their efficiency. Yet, adding personnel to your permanent payroll can throw your staff off balance when the job is completed.

A good way to handle these special problems—with dispatch, economy and efficiency—is to call in *outside* specialists. For almost fifty years, companies have called on EBASCO's engineers, constructors and business consultants to help with such problems. For them, EBASCO has made business studies, prepared financial programs, set up systems for production control and cost accounting, and performed many other valuable services. In design and construction, EBASCO has planned and built over a billion dollars worth of new plants all over the world.

Services like these can mean more efficient operation of your firm . . . can relieve you and your other top executives of a myriad of details that might otherwise prove burdensome. In the long run, the savings you effect by calling in EBASCO far outweigh the reasonable cost.

"The Inside Story of Outside Help," shows in detail how EBASCO can help you. Write for your copy today. Address: Ebasco Services Incorporated, Dept. M, Two Rector Street, New York 6, N. Y.

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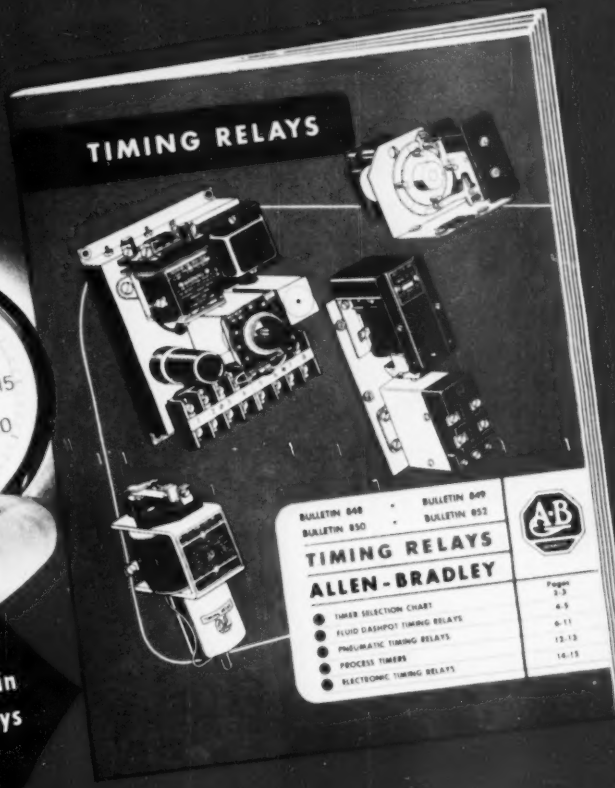


Send for this 16-page Bulletin on Allen-Bradley Timing Relays

FOUR POPULAR TIMERS • SIMPLE AND DEPENDABLE

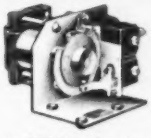
PNEUMATIC

Bulletin 849 pneumatic timing relay is a long life timer of high repetitive accuracy. Has an adjustable pneumatic bellows for regulating the tripping time. Time delay minimum—⅛ second; maximum—3 minutes. The operation of this pneumatic timer is easily changed from "on delay" to "off delay." A reliable, compact timer that is available in a wide variety of contact arrangements. It can be furnished in open type or in enclosures of various constructions.

FLUID DASHPOT

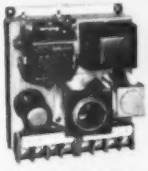
Bulletin 848 fluid dashpot timing relay is a low cost, adjustable timer for applications not requiring a high degree of accuracy, such as for timing electrically operated valves, motor starting sequences, etc. Time delay minimum—2 seconds; maximum—30 seconds. Single pole contacts, either normally open or normally closed. Silicone dashpot fluid assures consistent action at low ambient temperatures. Furnished in open type for panel mounting, or in pressed steel and cast iron enclosures for every service.

MOTOR DRIVEN



Bulletin 850 Style L motor driven timer is a precision switch of the maintained contact type. It alternately opens and closes two switch units 2, 3, 4, or 6 reversals per min. Ideal for controlling reversible machinery such as laundry washers or other processing equipment. Run and drift time easily adjusted. Silver alloy contacts.

ELECTRONIC



Bulletin 852 Electronic Timer has a thyratron tube used as a combination a-c rectifier and electronic switch. In 8 timing ranges from 0.025 sec. to 2 min. Accuracy 2% of setting. Ideal for machine tools, high frequency heating equipment, and photographic printing.

STANDARD ENCLOSURES FOR EVERY SERVICE

NEMA Type 1

NEMA Type 4

NEMA Type 7

ALLEN-BRADLEY

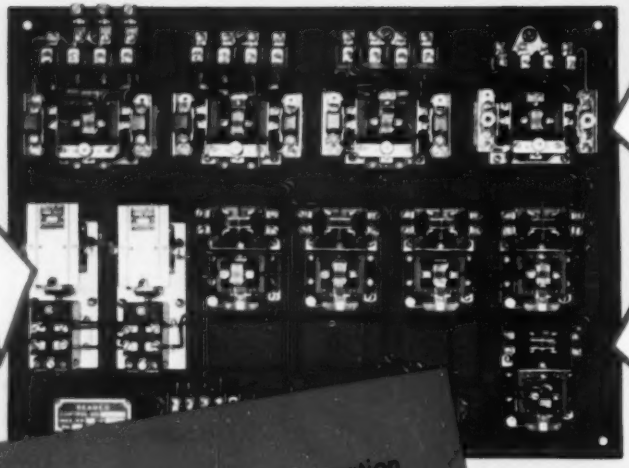
QUALITY

TIMING RELAYS

A-B Quality

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

6-52—MR



CONTACTORS for Power Circuits

TIMING RELAYS for Sequence Control

RELAYS for Control Circuits

For Continuous Trouble Free Plant Operation

use ALLEN-BRADLEY RELAYS and CONTACTORS

NO CONTACT MAINTENANCE

Bulletin 849 Timer

Pneumatic timers adjustable ⅛ sec. to 3 min.

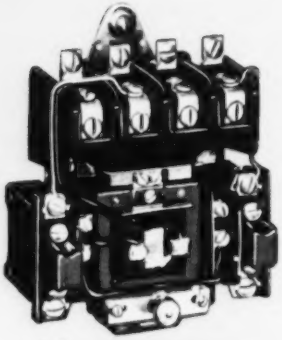
If you are laying out a new automatic manufacturing process, you can avoid costly operating shutdowns by using time tested controls . . . like Allen-Bradley trouble free relays, contactors, and switches.

Not only does the A-B trademark assure you of quality control units . . . with long, maintenance free life . . . but you will like the day in and day out consistency of their switching performance.

The variety of A-B units for handling interlocking or other special controls for manual, semiautomatic, or automatic operation will please you.

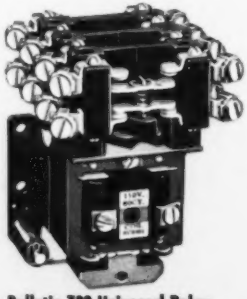
The compact Allen-Bradley handy catalog is a valuable reference guide in selecting the control components for any sequence control operation. We shall be glad to send you a copy.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.



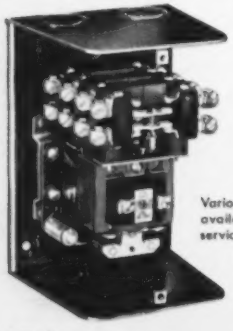
Bulletin 709 Solenoid Switch

A compact across-the-line starter, with or without enclosures, in eight sizes. Thermal relays give reliable overload protection.



Bulletin 700 Universal Relay

With four N.O. and four N.C. contacts. Good for millions of operations.



Various enclosures are available to meet any service requirements.

A-B Quality

ALLEN-BRADLEY

RELAYS · CONTACTORS

QUALITY

6-52—M

How to be Sure You Don't get "SHORT-CHANGED"

...NEXT TIME YOU BUY TAPE!

While minimum length can be depended on to be accurate in any roll of tape, it's the *weight* of the roll that you must watch. It is important for you to know: Does the No. 4 Roll actually weigh 4 ounces, as it should; and the No. 8 Roll 8 ounces?

For weight reveals whether tape is full strength in substance, or whether its protective and adhesive properties have been weakened due to skimpy materials. Underweight tape means you must use more of it, and take the extra time to roll more on, when a job requires maximum tape protection.

You can always weigh every roll you buy, of course, but why bother, when HAARTZ-MASON publicly makes you a DUAL GUARANTEE — a guarantee covering both weight and length, and prints this information boldly on every roll and container.

So get full measure the next time you buy tape by accepting none but the DUAL GUARANTEED HAARTZ-MASON brands.

Haartz-Mason, Inc.
WATERTOWN 72, MASSACHUSETTS

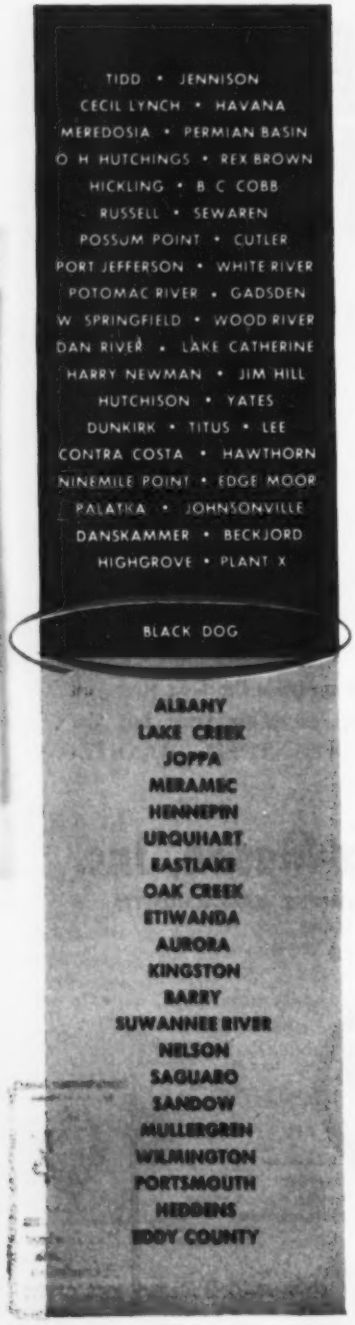
PARAPLASTIC Plastic Tape that does the work of both rubber and friction.

Note: Weight and length information are printed boldly on every roll and container.

Emblem of BUSINESS CHARACTER
Rice Leaders of the World Association

NEW UTILITY STATIONS C-E EQUIPPED

Includes stations placed in operation since the war (in white) and those under construction or being engineered.



NEW BLACK GOES INTO

The new Black Dog steam electric generating station of the Northern States Power Company recently took its place in Minnesota's rapidly expanding power system when the plant's first unit – a 60,000 kw turbine-generator – was placed in service. A second unit, 90,000 kw, is scheduled for service in 1954.

This new plant, located on the Minnesota River, south of Minneapolis and St. Paul, will be one of the company's main base-load plants and will have an ultimate installed capacity of over 300,000 kilowatts.

The Black Dog Station is part of the Northern States Power Company's continuing construction program designed to keep ahead of the electrical requirements of the area it serves. By the end of 1952 the company's net generating capacity will have been increased by 364,855 kilowatts, or 62% since the end of World War II. This is typical of electric utilities throughout the United States, who collectively have increased their generating capacities by approximately 50% in the past five years.

The new 60,000 kw turbine-generator is served by a C-E Steam Generating Unit designed to supply 600,000 lb of steam per hr at 935 psi and 950 F. A cross sectional elevation and brief description of this unit appears on the opposite page.

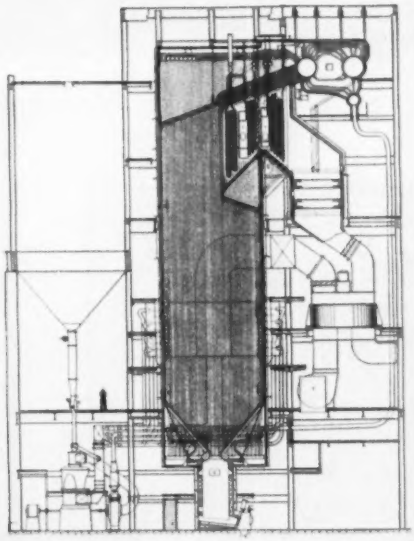
C-E

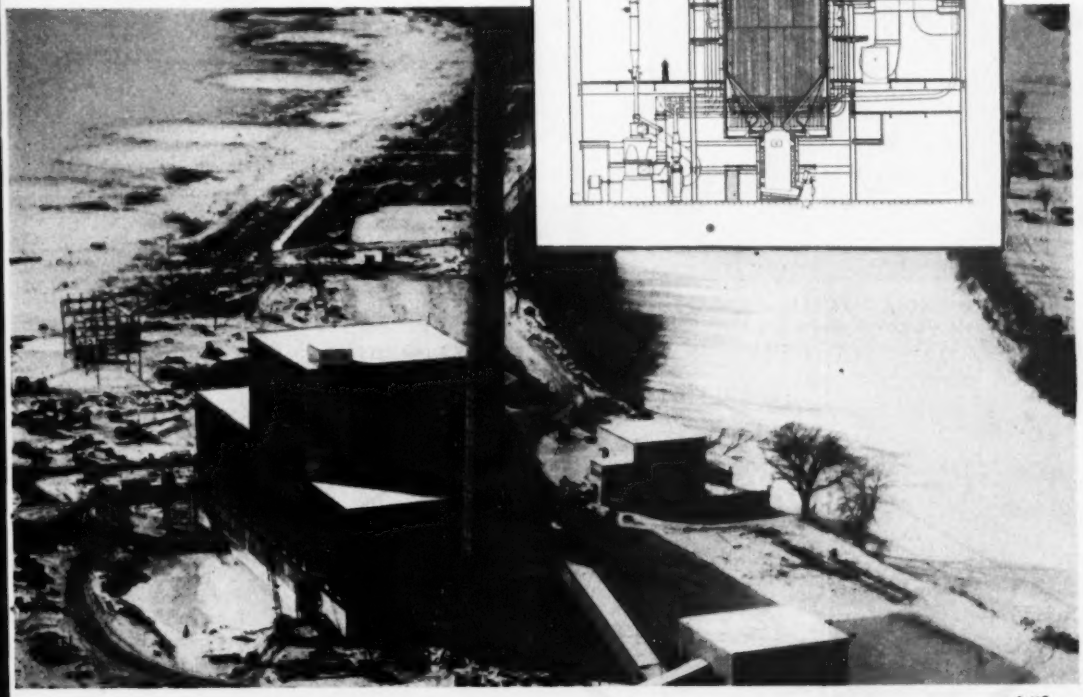
COMBUSTION

200 MADISON AVENUE, NEW YORK 16, N. Y.

DOG STEAM STATION SERVICE

The C-E Unit shown at the right was recently placed in service at the Black Dog Station. It is a radiant type boiler with 3 stage superheater and employs economizer surface in the last pass. Regenerative type air heaters follow the economizer surface. The unit is designed for pulverized coal firing using bowl mills and tilting, tangential burners. Natural gas is used as an alternate fuel.





B-617

ENGINEERING—SUPERHEATER, INC.

ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS

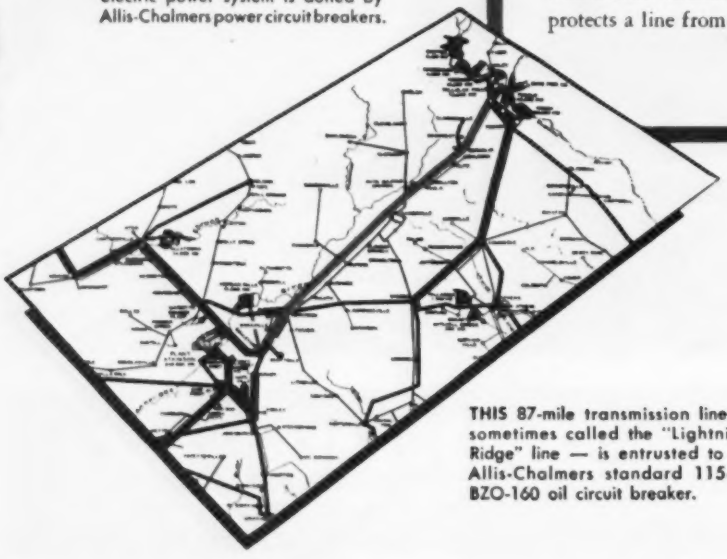
STANDARD BZO BREAKER Protects Georgia Power's

GEORGIA POWER'S statewide electric power system is dotted by Allis-Chalmers power circuit breakers.

ALLIS-CHALMERS BZO-160 breaker at right in the picture was installed during 1948 in Georgia Power's Boulevard Substation. It forms the Atlanta terminus of an 87-mile transmission line from the Northeast Georgia Hydro Plants. This 115-kv line has given 40 years of service in a territory averaging 60 electrical storms a year.

It's definitely a tough job for a breaker. But yearly inspections since installation have revealed contacts, oil, and all other parts in excellent condition. The only preventive maintenance was routine filtering of the oil.

The 115-kv, 3,500,000-kva breaker at left in the picture — one of many A-C high-voltage transmission breakers purchased since 1948 — protects a line from Plant Atkinson. A-3790



THIS 87-mile transmission line — sometimes called the "Lightning Ridge" line — is entrusted to an Allis-Chalmers standard 115-kv BZO-160 oil circuit breaker.

'Lightning Ridge' Line!

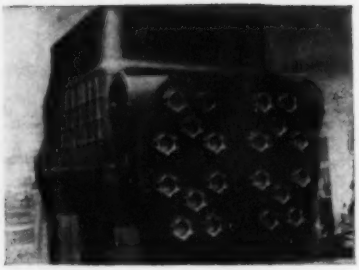
BECAUSE Georgia Power Company's power production rose 81.6% in the postwar years, many new circuit breakers with higher ratings and speeds were needed. The A-C high-voltage outdoor breakers chosen by Georgia Power have proved themselves by their service records. For details about these *time-proved* breakers, ask your A-C representative for Bulletins 71B6022, 71B6421, and 71B7045, or write to Allis-Chalmers, Milwaukee 1, Wisconsin.

Power OIL CIRCUIT BREAKERS

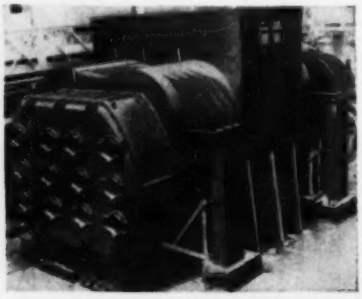
ALLIS-CHALMERS

Electrical Protection DEPENDS ON Mechanical Perfection

CON EDISON'S EAST RIVER ELECTRIC GENERATING STATION at 14th Street, New York City, will contain the new Worthington 125,000 sq-ft condenser. The shell, which is to be installed under 160,000-kw Unit No. 7, will contain nearly 105 miles of ¾" O.D. aluminum brass tubes and will require 138,000 gpm of East River water supplied by two 54 in. Worthington "Mixflo" vertical single suction volute circulating pumps.



WORTHINGTON CONDENSER installed in 1931 to serve 160,000-kw Unit No. 7, Hudson Avenue Station. Tube sheets were drilled for 110,000 sq ft with 101,000 sq ft installed.



ONE OF TWO 74,500 SQ-FT 2-PASS WORTHINGTON CONDENSERS serving 60,000-kw Units 14 and 15 at Waterside Station No. 1.

Con Edison once again installs "largest" condenser

On several occasions over the past fifty years, Worthington has been selected to build the "world's largest" surface condensers in single shell design.

In 1919, a 70,000 sq-ft condenser was installed under a 35,000-kw turbine-generator for a prominent utility company. This was the largest single shell surface condenser of its day.

In 1931, Brooklyn Edison Company (now Consolidated Edison Company of New York, Inc.) installed, under 160,000-kw Unit No. 7 at the Hudson Avenue Station, the "world's largest" at that time, a 101,000 sq-ft single-pass Worthington condenser. This was followed, in 1949, by two 74,500 sq-ft condensers for Waterside Station No. 1.

Now, Worthington is again building for Con Edison the "world's largest" single-shell condenser ever ordered, 125,000 sq-ft, single-pass, for the 160,000-kw Unit No. 7 addition to East River Station.

Worthington, with over a century of experience in the manufacture of steam power equipment, is prepared to build efficient condensers in all sizes. Let us advise you, without obligation, on your new installation.

Write, stating requirements, to *Worthington Corporation, Steam Power Division, Harrison, New Jersey.*

Z.2.2

World's Broadest Line of Steam Power Plant Auxiliaries

WORTHINGTON

Condensers

Check all the facts...

SEALED PRESSURE HINGE CONTACTS—always protected and clean—ELIMINATING A SECOND MAKE-AND-BREAK. Continuous, annular, constant electrical contact—NO POSSIBILITY OF ARCING OR BURNING. More than twice the momentary rating of the switch fails to mark the contacts—ELIMINATING ANY NECESSITY FOR INSPECTION—and R&IE Enclosed, Protected Contacts REQUIRE NO BY-PASSING OF ANY PART OF THE HINGE.

HI-PRESSURE CONTACT—of necessity a make-and-break. This R&IE design, now generally adopted, is most reliable for this critical point. Most effective and efficient construction is beryllium copper, with its inherent spring pressure and NO BACK-UP SPRINGS, plus copper fingers for high thermal capacity. High momentary tests prove it, YET IT IS MORE VULNERABLE TO HAZARDS THAN A PROTECTED CONTACT. **Why have more than one?**

PROGRESSIVE BLADE MOTION—reduces operating effort. Blade operation is smooth, with a simple, powerful leverage free of small parts and exposed pins. Small radii for ice shear.

SAFETY TERMINALS—with four half-inch bolts on 1¾ inch centers.

MANY OPERATING HAZARDS-

that make most contacts

HARDLY AFFECT THE *type* TTR49

Here's why!

STANDARD INSULATORS—with brown wet-process porcelain. NEMA standard.

ADJUSTABLE LIMITS—for aligning blades and correcting inter-phase rods.

ALL-WEATHER DRY BEARING—for trouble-free operation. weather-sealed, stainless ball bearings on bronze races. Adjustable take-up nut. Galvanized, forged steel rotor.

RIGID STEEL CHANNEL BASE—galvanized and punched for any standard mounting. Structural steel for high strength.

R&IE

R&IE EQUIPMENT DIVISION

I-T-E CIRCUIT BREAKER CO.

GREENSBURG, PA.

The Full Line

CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS

DISCONNECTING SWITCHES INDOOR AND OUTDOOR

HORN GAP SWITCHES

INTERRUPTER SWITCHES

CUTOUTS AND THERMO-RUPTERS

DISTRIBUTION EQUIPMENT

SWITCH OPERATING MECHANISMS

SUBSTATIONS

OPEN OR ENCLOSED, ISOLATED PHASE HEAVY DUTY BUSES

KIRK INTERLOCK SYSTEMS

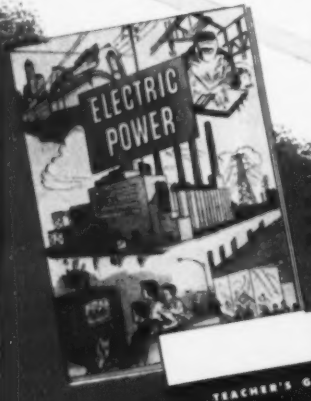
AUTOMATIC SWITCHING EQUIPMENT

METAL CUBICLES

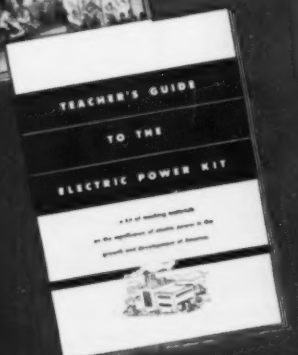
TESTING DEVICES

Announcing

an important new community relations tool for every power supplier



24-page, full-color, ...noon-type booklet. ...ric Power", for ...ent's personal ... booklets sup-



Teacher's Guide gives practical suggestions for utilizing the materials.

The Electric Power Kit consists of four parts, illustrated on these pages. *Above:* Full-color, cardboard model of an electric generating station, 14″ x 28″ x 18″.

THE ELECTRIC POWER KIT

dramatically presents the story of electric power through the schools of your community

The school children of today will, in a few years, be your customers. What they learn *now* about electric power is important to your company.

Westinghouse, as a service to the industry, has developed the Electric Power Kit, a set of related teaching aids designed to help young people understand the importance of electric power. Developed with the advice and guidance of leading educators and power supplier executives, and thoroughly tested in the classroom, the Kit has been enthusiastically received by teachers and students alike.

The Electric Power Kit is a valuable community relations tool. Its use in the schools in your area will help build your reputation as a good neighbor, add to the attractiveness of your company as a place to work, create an understanding of your problems, and develop an appreciation of the valuable services your company performs for the community.

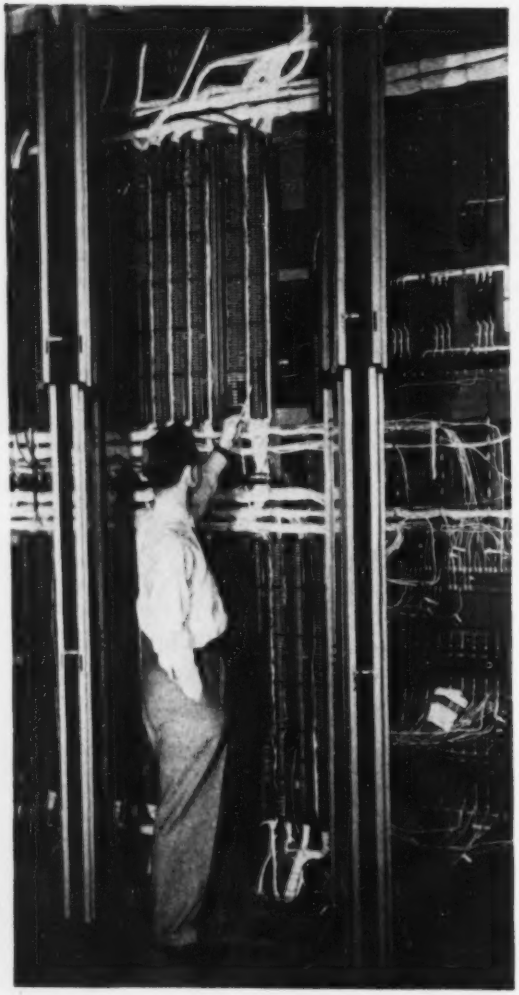
This is *your* Kit. It will be distributed to the schools by electric power suppliers. For full information—how to obtain it, how to introduce it to the schools—contact the Westinghouse office nearest you. School Service Department, Westinghouse Electric Corporation, Pittsburgh 30, Pa. G-10244

YOU CAN BE SURE...IF IT'S
Westinghouse

WESTINGHOUSE SCHOOL SERVICE

Three full-color wall charts (29″ x 40″) show the changes brought about in a typical American community by the advent of power—first steam, then electricity.

over 100 miles of cosmotron

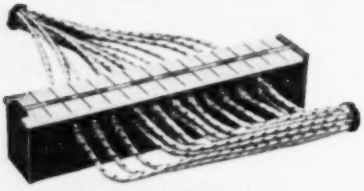


Bank of Control Terminals of Brookhaven Cosmotron, with compact, trouble-free wiring made possible by use of three different types of Burndy connectors.

52-21

Burndy connectors are integral units of the Cosmotron electrical control panels . . . because Burndy combines *maximum electrical efficiency* with *mechanical strength* that withstands the most severe stress and vibration. What's more, in the over 100 miles of wiring, hundreds of thousands of electrical connections were made largely by *electricians without special training*—because Burndy connectors rely on *engineered design* to insure stable, secure connections.

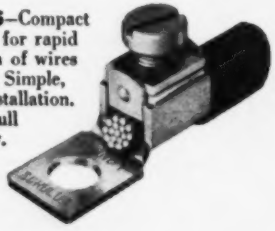
Naturally, Burndy is very proud to be part of the Brookhaven Cosmotron —and equally proud of our myriad everyday jobs in utilities, industry, manufacturing, general service.



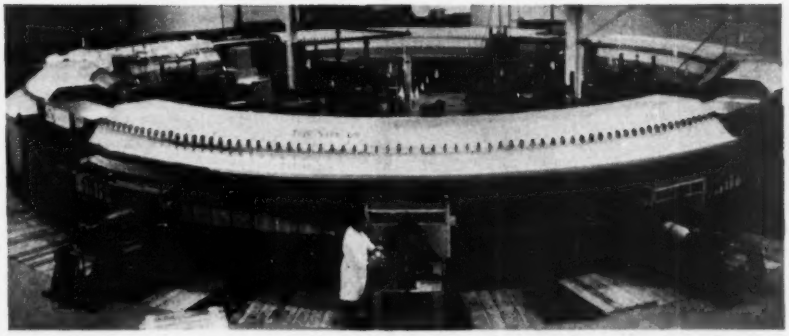
CRABLOKS—Quick-connect, quick-disconnect terminal blocks, placed end-to-end, provide multiple secure terminal connections in small space.

HYLUGS —Indent-type terminals—with matched Burndy tooling—provide secure, uniform, low-resistance connections, easily installed and inspected.

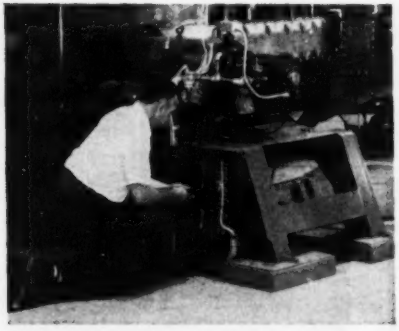
SCRULUGS—Compact connectors for rapid termination of wires and cables. Simple, one-tool installation. Maintain full re-usability.



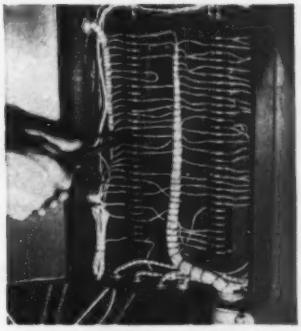
circuits
connected by BURNDY



Cosmotron at Brookhaven National Laboratory, Upton, L. I. World's most powerful atomic accelerator utilizes 40 million watts, accelerates nuclear particles to 170,000 miles per second.



View of the Cosmotron, showing diffusion pump, with terminal box in foreground.



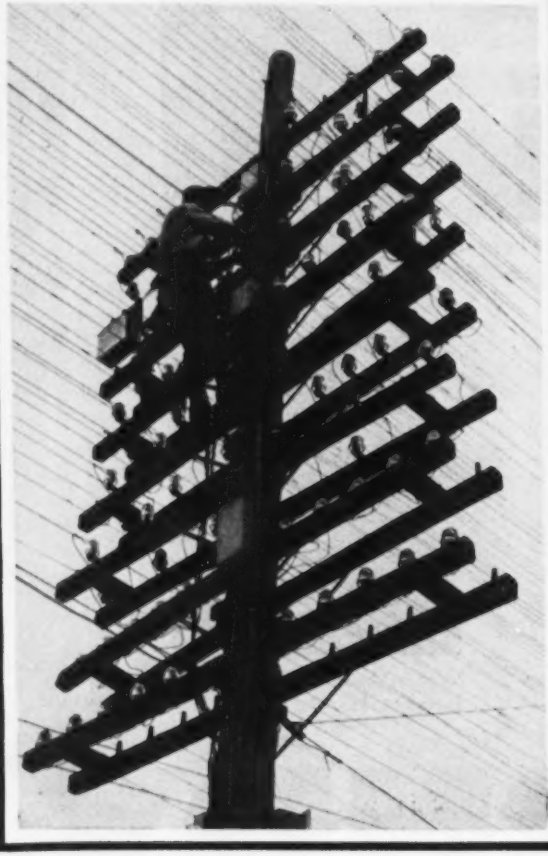
Terminal box at left with Burndy Crabloks and Hylugs.

BURNDY

BURNDY ENGINEERING COMPANY INC., NORWALK, CONNECT. **BURNDY CANADA LTD.,** TORONTO 8, ONT.

Same wires– many more voices

Connecting new multi-voice system to open-wire lines, near Albany, Georgia. With new system, 150,000 miles of short open-wire telephone lines can be made to carry up to 16 simultaneous messages economically.



MUCH of your Long Distance telephone system works through cable but open-wire lines are still the most economical in many places. Thousands of these circuits are so short that little would be saved by using elaborate carrier telephone systems which are better suited for long-haul routes. But a new carrier system . . . the Type O designed especially for short hauls . . . is changing the picture. It is economical on lines as short as 15 miles. With Type O thousands of lines will carry as many as 16 conversations apiece.

Type O is a happy combination of many elements, some new, some used in new ways. As a result, terminal equipment takes up one-eighth as much space as before. Little service work is required on location; entire apparatus units can be removed and replaced as easily as vacuum tubes.

Moreover, the new carrier system saves copper by multiplying the usefulness of existing lines. For telephone users it means more service . . . while the cost stays low.

Repeater equipment is mounted at base of pole in cabinet at right, in easy-to-service position. Left-hand cabinet houses emergency power supply. System employs twin-channel technique, transmitting two channels on a single carrier by using upper and lower sidebands. A single oscillator serves two channels.

BELL TELEPHONE LABORATORIES

Improving telephone service for America provides careers for creative men in scientific and technical fields

ALLIS-CHALMERS
INSTRUMENT
TRANSFORMERS

Outdoor current transformer for heavy duty metering, Type KO. Ratings up to 15 kv and 800 amperes.

Outdoor potential transformer, 200 va, Type PWD. Ratings up to 15 kv.

Indoor potential transformer, 200 va, fused or unfused, Type PD. Ratings up to 14,400 volts.

Safety Factor *stepped up!*

BECAUSE OF THIS VACUUM-PRESSURE PROCESS

THE SPECIAL CHAMBER shown above houses a modern vacuum-pressure system for compound-filling Allis-Chalmers instrument transformers. Here the core-and-coil assemblies and compound become a compact unit—with all parts positively positioned for life. And because air and moisture are kept out permanently, insulation strength is retained almost indefinitely.

Here's How It Works

When the door is closed on the core and coil assemblies (preheated before they are placed inside), a combination of high vacuum and Sahara-like heat whisks away all moisture and entrapped air. Soon the assembly is bone dry. Then hot liquid compound—from which air and moisture are removed—is directed into the transformer case. When case is full, vacuum is released. The hot compound is forced into the innermost recesses of the tanked assembly, completely filling all voids. The transformer is then removed to another area for cooling and final finishing.

You Get 4 Big Benefits

The Allis-Chalmers method of compound-impregnating results in a higher safety factor for your instrument transformer . . . giving you these four advantages:

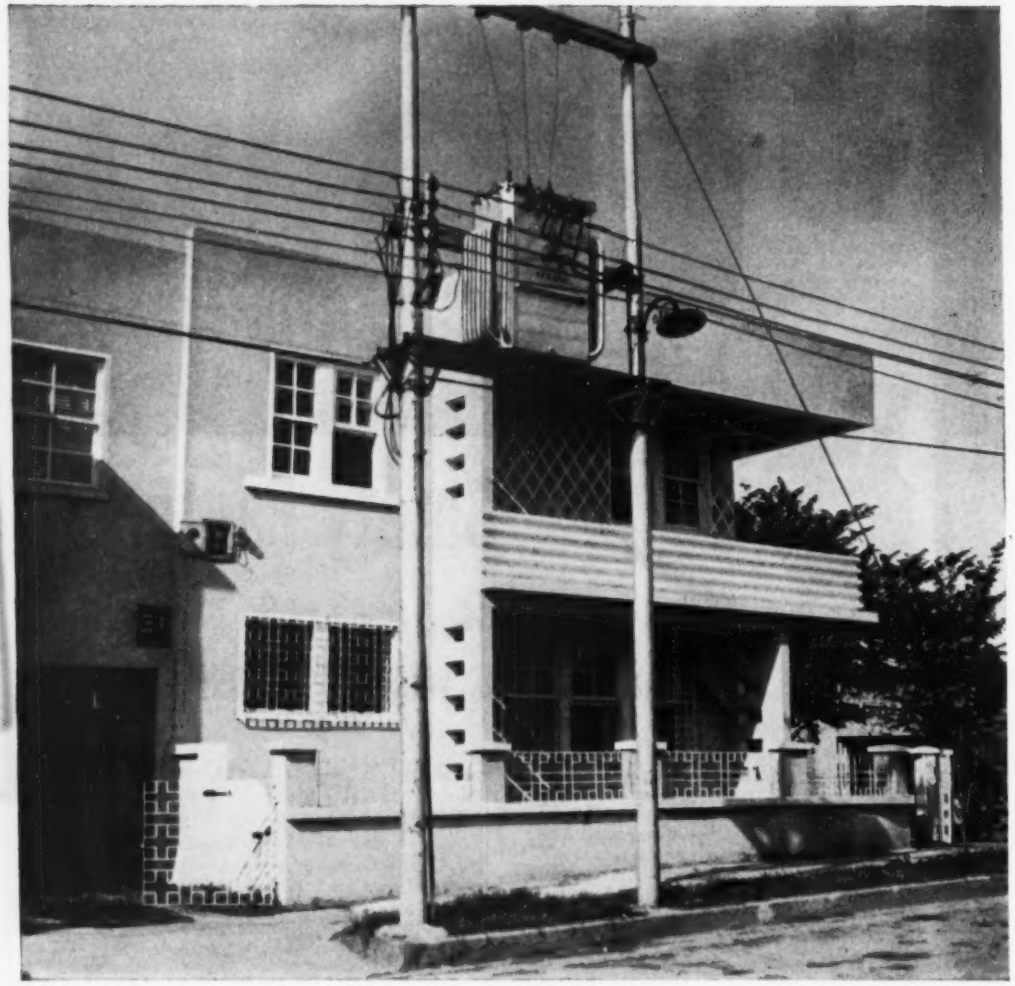
1. High dielectric strength
2. Air and moisture cannot attack insulation
3. Eliminates maintenance of an insulating medium
4. No leakage or contamination

The extra benefits resulting from this compound-impregnating process can save you money. Why not contact your nearby Allis-Chalmers district office today for more information. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A 3742

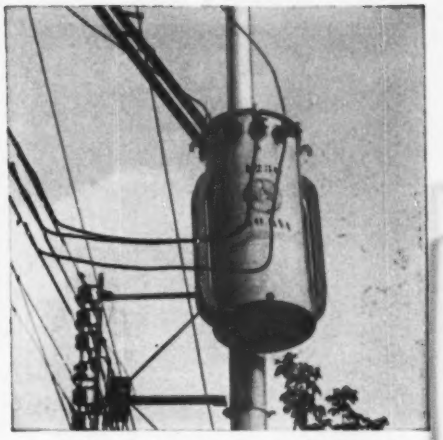
ALLIS-CHALMERS

Wagner Transformers

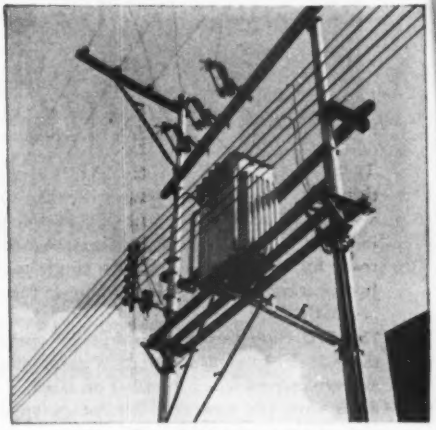


Wagner Electric Corporation
EST. 1891

give dependable distribution of power in Cali Colombia



Single-phase, pole-type transformer at Cali. Thousands of these dependable Wagner transformers are in use throughout the world.



Typical three-phase, platform mounted transformer used in Cali, Colombia installation.

These Wagner Distribution Transformers are installed on a power company system in Colombia, South America... The unfailing dependability of Wagner transformers has long been famous throughout the world.

When you make your selection from Wagner's widely diversified line of distribution transformers —you get the benefit of improved design. All Wagner pole-type, single-phase transformers with round tanks in ratings 100 kva and below are furnished with preformed cores of cold-rolled, oriented grain steel. You get the SHUR-SEAL Cover that provides true sealed tank construction and the new Wagner tank wall mounted high voltage bushing. You get better performance... longer life... and mechanical features that are standardized in full accordance with E. E. I.—NEMA recommendations in all standard kva and voltage ratings.

Wagner has a nationwide organization to provide fast, convenient service, with branches in 32 principal cities. Bulletins TU-180 and TU-181 give complete information on Wagner Transformers.

WAGNER ELECTRIC CORPORATION
6456 Plymouth Avenue • St. Louis 14, Mo., U. S. A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC
BRANCHES IN 32 PRINCIPAL CITIES

T52-14

Connect the service leads . . . plug in the meter . . . *That's all!*

The STU Heavy-Duty Socket

There's no need to devise special metering facilities for heavy current applications when you use Westinghouse Transockets. All components are in place . . . complete with secondary wiring—ready for installation . . . all in a single package! Just connect the service leads, plug in the meter . . . that's all.

The STU High-Capacity Socket lets you utilize the full inherent capacity of Westinghouse 50 ampere meters, when installed on services using #4/0 wire. It's now available for polyphase as well as for single-phase applications.

The STS Transocket combines the socket and Type MR current transformers in one compact enclosure . . . handles heavy loads up to 400 amperes.

Both units are ready to install . . . inexpensively . . . easily . . . and take standard S-Type meters.

Here's real help! The Westinghouse "Meter Socket Selector," B-5284, makes it easy for you to select the proper socket for any application. It's 20 pages, fully illustrated, covering all types of service . . . all capacities. To get your copy, write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-40426-A

YOU CAN BE SURE...IF IT'S

Westinghouse

METERS

Joslyn DIRECT-SEAL LUMINAIRES

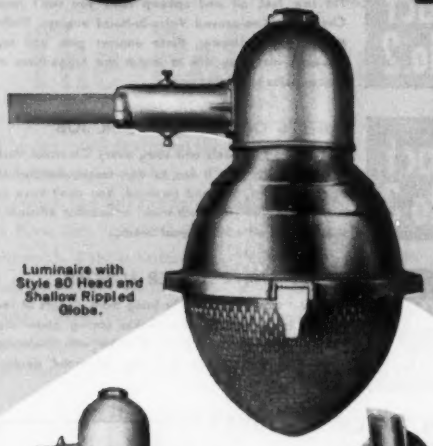
Effective Metal-to-Glass Seal without use of gaskets — with Automatic-Latching Glassware

HIGH ILLUMINATION EFFICIENCY

PERMANENT AND RUGGED

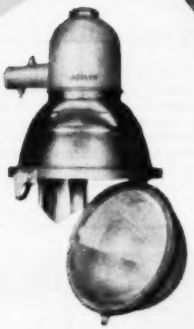
ELECTRICAL DURABILITY

CONVENIENCE OF OPERATION



Luminaire with Style 80 Head and Shallow Rippled Globe.

Years of successful operation in the field have proved the effectiveness of the patented Joslyn Direct-Seal Luminaire design which eliminates troublesome gaskets.



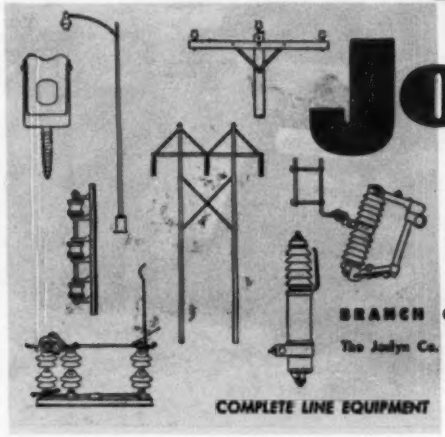
Luminaire with Glassware Unlatched for Lamp Replacement.

Detail of Hinge.

Detail of Direct-Seal High Pressure Latch.

FEATURES:

- Latch and hinge attached to die cast aluminum ring surrounding bottom flange of reflector prevents distortion of reflector due to latching pressure.
- The high pressure automatic latch draws the glassware ring upward, compresses the circular wave-type spring and thus provides a tight, direct seal of uniform pressure between glassware and reflector.
- This design permits easy relamping from the ground.
- For glassware replacement, the holding ring of die cast aluminum is easily and quickly assembled to the Holophane refractor or globe without use of tools.
- Conforms to latest requirements as to interchangeability with respect to reflector-glassware assembly, sockets and series receptacles.



COMPLETE LINE EQUIPMENT

Joslyn

MFG. AND SUPPLY CO.

20 North Wacker Drive • Chicago 6, Ill.

BRANCH OFFICES IN PRINCIPAL CITIES

The Joslyn Co. • The South East Joslyn Co. • Southern Joslyn Co. Joslyn Southwest Co. • Joslyn Pacific Co.

Let these
plain hard facts show
you how you'll save
with
CHEVROLET
Advance-Design
TRUCKS

CHEVROLET first in demand in value in sales

Fact No. 1

THEY LIST FOR LESS

Yes, Chevrolet trucks *list for less* than *any* other comparable truck capable of handling the same payloads. And yet, in a Chevrolet you'll find a combination of great truck features you can get in no other truck.

Fact No. 2

EVERY MILE AN ECONOMICAL MILE

For low fuel, oil and upkeep costs you can't beat Chevrolet's time-proved Valve-in-Head engines. Thriftmaster or Loadmaster, these engines give you top economy and long life to match the ruggedness of frame, axles and other units.

Fact No. 3

THERE'S ONE TO FIT YOUR JOB

Right down to wheels and tires, every Chevrolet truck is fitted to the job it has to do—*factory-matched* to operating conditions and payload. You don't have to waste money on "too much truck" or sacrifice efficiency with "too little truck" for your needs.

Fact No. 4

VALUE STAYS HIGHER LONGER

Chevrolet trucks traditionally bring more dollars at resale or trade-in than other makes costing about the same when new. You get more value with Chevrolet trucks from first to last. See your Chevrolet dealer.

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load • **POWER-JET CARBURETOR**—for smooth, quick acceleration response • **DIAPHRAGM SPRING CLUTCH**—for easy-action engagement • **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting • **HYPOID REAR AXLE**—for dependability and long life • **TORQUE-ACTION BRAKES**—on light-duty models • **PROVED DEPENDABLE DOUBLE-ARTICULATED BRAKES**—on medium-duty models • **TWIN-ACTION REAR BRAKES**—on heavy-duty models • **DUAL-SHOE PARKING BRAKE**—for greater holding ability on heavy-duty models • **CAB SEAT**—with double-deck springs for complete riding comfort • **VENTI-PANES**—for improved cab ventilation • **WIDE-BASE WHEELS**—for increased tire mileage • **BALL-TYPE STEERING**—for easier handling • **UNIT-DESIGNED BODIES**—for greater load protection • **ADVANCE-DESIGN STYLING**—for increased comfort and modern appearance.

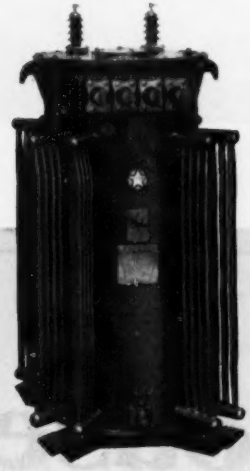
CHEVROLET DIVISION OF GENERAL MOTORS, DETROIT 2, MICHIGAN

4000 The Pole Star CORE makes the difference...

The patented design of the Pole Star core enables Pennsylvania to build Pole Star transformers through the full range of distribution sizes from 3 Kva through 500 Kva and from 2400 volts through 43800 volts. The Pole Star core takes full advantage of the high permeability and low loss characteristics of the oriented electrical steel and provides a core with low exciting current and low core loss.

Core Builder assembles laminations in 500 Kva Pole Star Coil

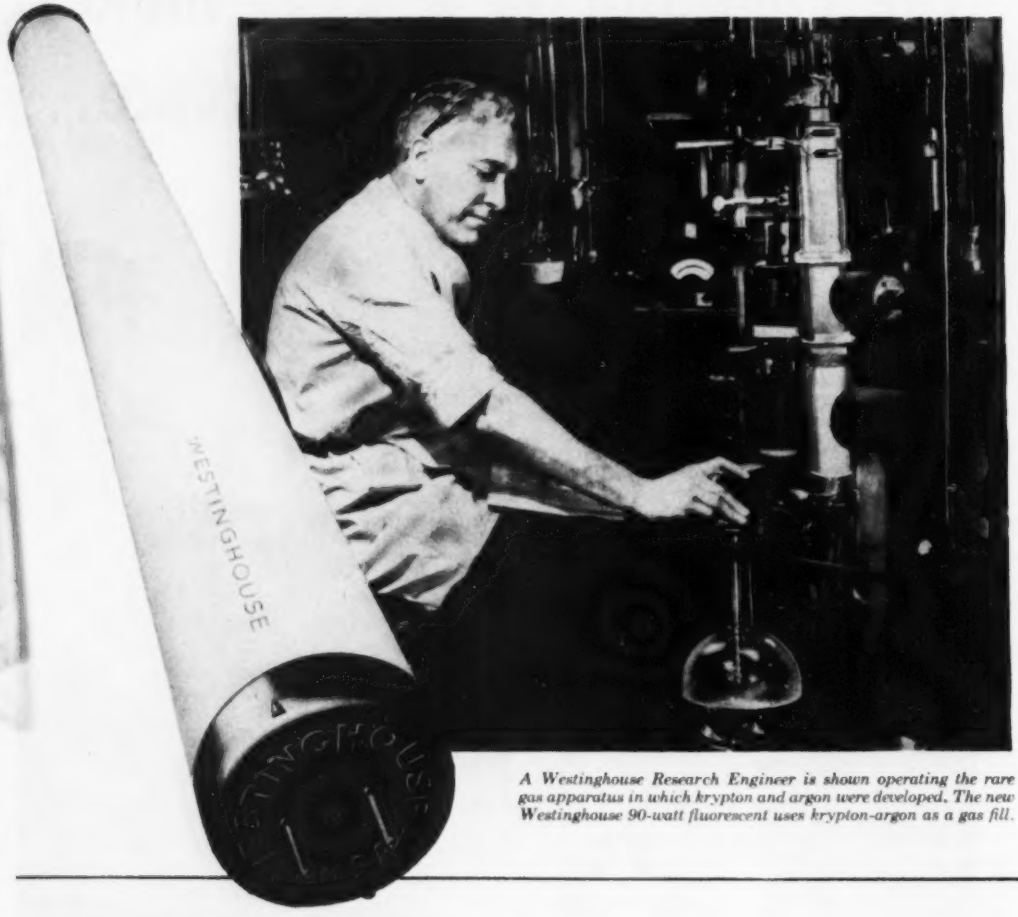
Laminations are brought through the coil and individually lapped. For ease of handling, core units for the 167 through 500 Kva sizes are constructed with four core sections. Each individual lamination forms its own magnetic path so that no flux has to cross from one turn to the next. In effect, each lamination is a core in itself.



For complete information on 167 to 500 Kva Pole Star transformers, write for free copy of Catalog No. 352.

Pennsylvania
TRANSFORMER COMPANY
BOX 330, CANONSBURG • PENNSYLVANIA • *Greater Pittsburgh District*

Rare gases boost light of new Westinghouse



A Westinghouse Research Engineer is shown operating the rare gas apparatus in which krypton and argon were developed. The new Westinghouse 90-watt fluorescent uses krypton-argon as a gas fill.

YOU CAN BE SURE...IF IT'S

Westinghouse

and efficiency 90 watt lamp

The light and efficiency booster in the new Westinghouse 90-watt fluorescent lamp is krypton-argon. This gas fill, exclusive with Westinghouse, takes only 2% more current to jump light output 6%. And after 7500 hours, this new lamp will still outshine every other lamp in its class.

The new 90-watt will fit your present 85-watt or 100-watt fixtures. It will hold the level of light above your minimum foot candle value longer. It'll reduce your yearly cost of light.

It has many other advantages. For one thing, with the new 90-watt, the ballasts run cooler because of lower wattage loss. But why not write us for more information. Just mail the coupon, or call your nearest Westinghouse Lamp Sales Office.

WESTINGHOUSE LAMP DIVISION, BLOOMFIELD, NEW JERSEY

TUNE IN ON HISTORY! Only Westinghouse brings you complete coverage of four-month political campaign over CBS television and radio.

NEWS FROM WESTINGHOUSE, THE FASTEST-GROWING LAMP MANUFACTURER

by Sam Hibben

STILL ROOM FOR ADVANCEMENT: Science has made vast strides in lighting efficiency, (measured by lumen output per watt of power input). Lamps today are up to 15 times more efficient than the old carbon filament incandescent lamp, with fluorescent lamps giving 60 lumens per watt. Near-perfect efficiency would be approximately 620 lumens per watt, and about the closest thing to that today is the common firefly—*he* produces 500 lumens per watt! That still leaves science something to shoot at.

SUCCESS STORY: 'Way last December, a picture was taken in Florida. A photographer set up two lamp bulbs 15 feet apart; one was a standard incandescent, one a Westinghouse Bug-A-Way light bulb. There were plenty of insects about, and the test showed amazing results—the standard bulb attracted hordes of bugs, while only a few were near the Bug-A-Way bulb. Moths and many other insects don't fancy yellow light!

IMAGINE: If you think local traffic is bad, put yourself in the position of an insect who often flies through hedges and trees at speeds above 60 m.p.h. And *he* never hits a branch, even without traffic lights. Of course, he also has some 600 lenses in each eye against only one in yours. Oh well, we'll just have to hobble along.

More next Month.

Samuel G. Hibben

WESTINGHOUSE LAMP DIVISION Dept. FW
Bloomfield, New Jersey

Please send me more information about the new Westinghouse 90-watt fluorescent lamp.

NAME .....

COMPANY .....

ADDRESS .....

CITY ..... STATE .....

BUY NOW AND SAVE! WESTINGHOUSE FLUORESCENT LAMPS STILL COST YOU LESS THAN THEY DID IN 1940, YET BURN SEVEN TIMES LONGER!

FOR BATTERY POWER with

LASTING POWER... CHOOSE PLANTÉ

Gould Planté—
The Aristocrat of
Stationary Batteries

Pure lead positive plates make Gould Planté batteries practically last forever. There's no antimonial impurities to contaminate negative plates and thus shorten battery life. Also, a huge reserve of pure lead continually replenishes spent active material in the positive plates. For amazing lasting power, there's *nothing* like Planté.

You may be able to save up to 50% on maintenance costs throughout the life of your stationary batteries through the use of the Gould Plus-Performance Plan. Write Gould Battery Information Headquarters for full details.

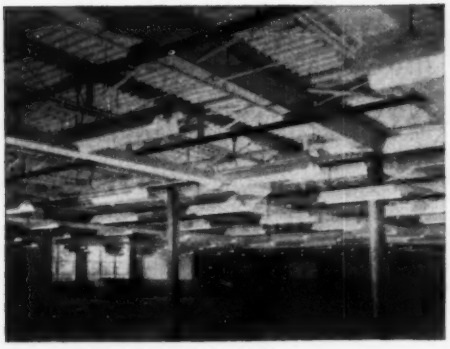
GOULD *Industrial Batteries*

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

Always Use Gould-National Automobile and Truck Batteries

Does your plant measure its growth potential by the length of its electric cords?

1. CAN YOU PLACE LIGHTS, POWER TOOLS, MACHINES OR APPLIANCES WHERE THEY'RE NEEDED MOST or is their positioning inflexibly set by the length of their electric cords and the location of *fixed* outlets? Here, maintenance man Thomas George of Connecticut Manifold Company shows how easy it is to locate a lighting fixture *exactly* where it will do the most good, as he slips its plug into a run of LTG FLEX-A-POWER®, Trumbull's pre-fabricated trolley and plug-in busway that is *one continuous outlet.*



2. MODERN DISTRIBUTION SYSTEMS MUST BE FLEXIBLE, ready for future expansion or rearrangement of lighting fixtures or production tools. This installation includes almost 1000 feet of LTG FLEX-A-POWER leading to every part of 50,000 square feet of floor space. Fixtures and small electric tools can be easily moved along the busway or, should future changes demand it, busway sections can be easily dismantled and re-assembled into a new system.

3. WHOLE LINES OF TOOLS CAN BE RELOCATED or entire lighting systems rearranged with FLEX-A-POWER. Power tools as well as the lights in this machine shop get their power supply from the LTG line above. *Learn now how LTG FLEX-A-POWER can solve your low-voltage distribution problems.* It comes in two-, three-, or four-pole types rated at 50 amps, 300 volts a-c or d-c.

NO SHORTAGE—Your Trumbull distributor's supply of FLEX-A-POWER is backed by ample factory stocks to meet all your distribution needs.

Write for circular TEC-3 on LTG FLEX-A-POWER. And remember, Trumbull has FLEX-A-POWER of other types to handle *all* your distribution needs.

Trumbull Assures LASTING FLEXIBILITY in Power Distribution

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.

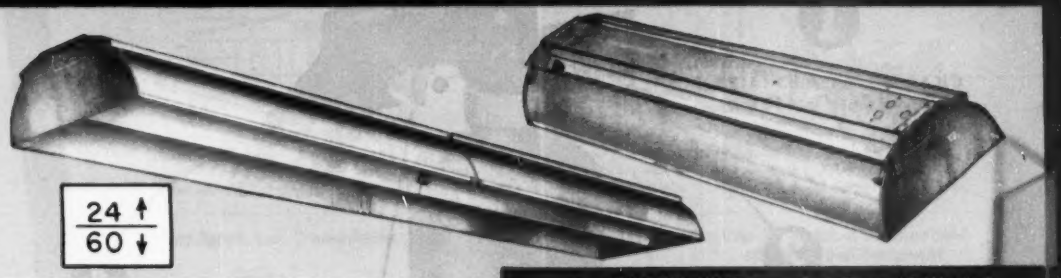
The most *Comprehensive* line of dependable PANEL INSTRUMENTS

There are no blanks in the WESTON line of panel instruments. It includes all the sizes . . . all the types, ranges, sensitivities, too. Many specials, as well; developed to meet unusual requirements. All are built in the finest WESTON tradition for sustained accuracy over years of dependable service. Your local WESTON representative will gladly cooperate on any panel instrument problem, or write direct to . . . WESTON Electrical Instrument Corporation, 617 Frelinghuysen Avenue, Newark 5, New Jersey . . . *manufacturers of Weston and Tag instruments.*

WESTON PANEL *Instruments*

Revolutionary!

NEW *Wheeler* "DAY-FLO UPLITER" INDUSTRIAL FIXTURE LINE



SINGLE LENGTH UNITS — For Two 40-Watt B-Pin Lamps and Two 48" or 96" T-12 Single Pin Lamps Operating at 430 MA. All for 110-125 Volt Circuit.
DOUBLE LENGTH UNITS — For Four 40-Watt B-Pin Lamps and Four 48" T-12 Single Pin Lamps.

1 ADVANTAGES

QUALITY DISTRIBUTION — Approximately 28° of total fixture distribution is UPWARD, and 72° is DOWNWARD, thus providing greater seeing comfort, better brightness ratios, and higher quality illumination.

BETTER SHIELDING — 35° crosswise shielding of both lamps reduces direct glare to a minimum.

LAMPHOLDERS — For Single-Pin Slimline Fixtures, lampholders are depressible type for push-pull lamp insertion. For Bi-Pin Pre-heat Fixtures, lampholders are rotary lock type with FS-4 starters and receptacles mounted in top of wiring channel.

AIR-ACTION CLEANING — Unique design permits a constant flow of air to circulate through fixture thereby reducing dust accumulation.

EASILY JOINED — By simply bolting End Plates together Continuous Rows of fixtures are quickly assembled. No couplings necessary.

REMOVABLE REFLECTORS — All reflecting surfaces can be quickly detached without the aid of tools.

2 MATERIALS AND FINISH

ONE-PIECE TOP CHANNELS — Constructed of 20-gauge steel, provided with adequate K.O.'s for mounting and finished in baked synthetic "LustRwhite" enamel.

FOR SEVERE SERVICE CONDITIONS — Fixtures are obtainable with 20-gauge Top Channels, finished in fused vitreous porcelain enamel. Suitable plated and gasketed mounting flanges will be factory mounted to such porcelain enameled channels when ordered and specified.

REFLECTORS — Are constructed of 20-gauge steel and completely covered by fused white vitreous porcelain enamel. Reflection factor of reflecting surface not less than 82%.

Baked Synthetic Enameled Reflectors are also available and are finished inside and outside "LustRwhite".

3 EASILY MOUNTED AND MAINTAINED

TOP CHANNELS — Specially grooved and provided with means for all conventional methods of mounting: — conduit stem — chain — stem hangers — or sliding clamp hanger.

REFLECTORS — are quickly and easily demountable.

4 SIMPLE TO ORDER AND INSTALL

All "Day-Flo Upliter" fixtures are complete and ready for either Individual or Continuous Mounting.

Continuous rows are made to any desired multiple of available fixture lengths.

All types of mounting and mounting accessories available. Channels have adequate K.O.'s for conduit stem suspension. Channel End Plates provide for Chain Hanging. Grooved top channel permits installation of Slide Hangers — minimum number of hangers per row always ONE MORE than actual number of fixture top-channels.

5 LABELS

Fixtures bear the Underwriters' Laboratories, Inc., and A. F. of L., I.B.E.W. labels.

Wheeler

Distributed Exclusively Through Electrical Wholesalers

WHEELER REFLECTOR COMPANY

275 Congress Street Boston 10, Massachusetts

REPRESENTATIVES IN PRINCIPAL CITIES

HERE'S A FIRE EXTINGUISHER YOU CAN RECHARGE AT ANY AIR PUMP!

1
CHARGES AT ANY AIR PUMP. Operates at 150 lbs. pressure.
2
COVERS GREATER AREA with Kidde's cloud-like discharge pattern.
3
POWDER WON'T PACK. Perfect for trucks, garages, factories, etc.
4
PRESSURE GAUGE in pistol-grip handle tells you when air is needed.
5
TRIGGER ACTION gives you finger-tip control.
Kidde

An ordinary air pump will prime this new Kidde dry chemical extinguisher with more fire-killing power than any other unit its size!

See how easy it is to recharge! Just unscrew the head, put in five pounds of dry chemical, screw the head back on and it's ready to take on air pressure from any plant or service station air pump.

And see how easy it is to operate! One hand swings this portable extinguisher into action. One finger squeezes the trigger. Poof! A cloudlike pattern of dry chemical smothers the fire while you remain safely behind a curtain of heat-absorbent powder.

This revolutionary new Kidde extinguisher is so safe, so sure, you'll find it a necessity for trucks, garages, power plants, electrical equipment—wherever there is a danger of small fires.

Write today for full information.

Kidde

Walter Kidde & Company, Inc.
1030 Main St., Belleville 9, N. J.
Walter Kidde & Co., of Canada, Ltd., Montreal, P.Q.

Advantages like these help you

Work Anywhere!

Only FWD has all these features that speed line construction and maintenance

Proper Weight Distribution

Only a true 4x4 gives you up to 40% of the weight on the front wheels. This gives you the extra traction needed to speed utility line work.

Full Torque P. T. O. . . . .

Utilizes full engine power through all transmission speeds. Exclusive safety lock prevents truck drive while boring.

High-Climb Oil Sump

Keeps oil pump constantly submerged. An FWD exclusive that lets you bore holes, set poles on steepest grades.

Two-Speed Aux. Transmission

Doubles the number of transmission gear ratios. Provides low gear ratio for full power at extreme low speeds in tough, cross-country operations.

Fully Compensated Drive

Three free-acting differentials compensate for differences in travel of all four wheels. Reduces drive line strains, eliminates needless tire scuffing.

Over 78 Matched Combinations of Trucks and Equipment

Now choose the exact mobilized tool that meets your requirements . . . and deal with *only* one source for complete service and supply.

DESIGNED WITH THE HELP OF VETERAN UTILITY MEN . . . FWD line construction and maintenance units handle your work . . . faster . . . safer . . . and at less cost. These mobilized tools get crews and equipment through to any location in spite of terrain or footing . . . speed work on the job . . . help maintain construction schedules or get service restored in a hurry. See your FWD dealer to get the facts on how FWDs can improve your service and earn more for each equipment dollar. The Four Wheel Drive Auto Co., Clintonville, Wisconsin. *Canadian factory*, Kitchener, Ontario.

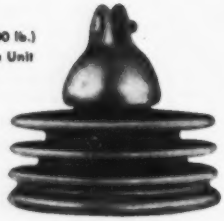
Built by the makers of America's Foremost Heavy-Duty Trucks

LET THE WEATHER TAKE OVER

YOUR INSULATOR-SCRUBBING CHORE

Lapp High-Strength (25,000 lb.) Fog-Type Suspension Unit

Lapp Standard (15,000 lb.) Fog-Type Suspension Unit

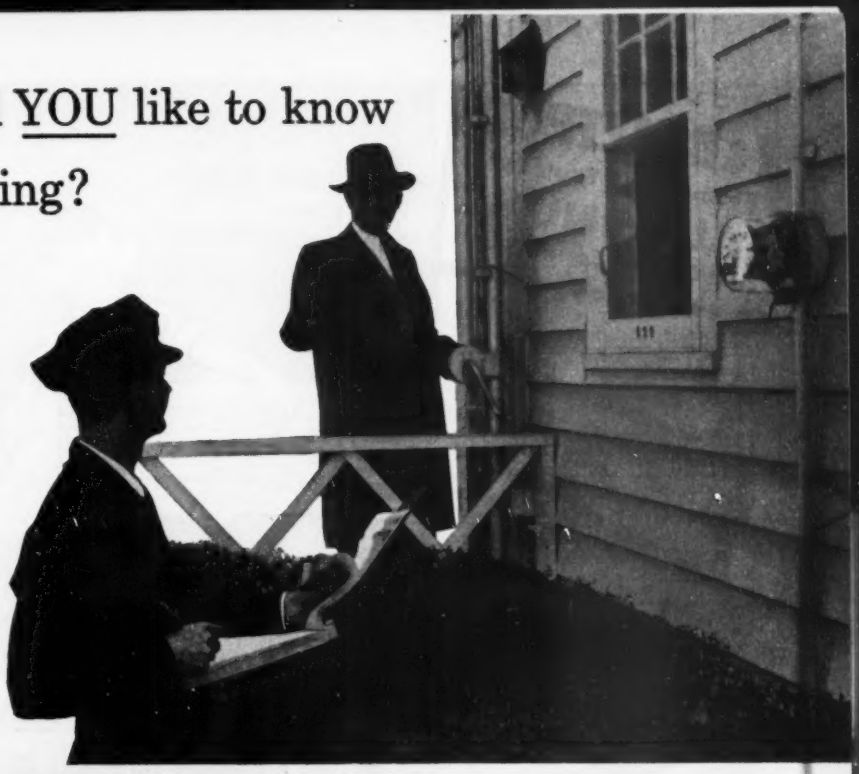


Industrial progress is wonderful! It builds load, increases national wealth, and is our hope for Peace by making us a formidable potential military power. But more and more industrial processes bring more and more contamination to transmission insulators. And some of it is sure hard to get off! Lapp Fog-Type design has a long record of successful service in areas of most severe salt fog, dust and industrial fumes. 56% more leakage distance than standard units gives it a big initial advantage. More uniform leakage path avoids arc-starting hot spots. And petticoat shape and spacing are such that wind and rain flush off accumulated dirt.

Lapp

LAPP INSULATOR COMPANY, INC., LE ROY, NEW YORK

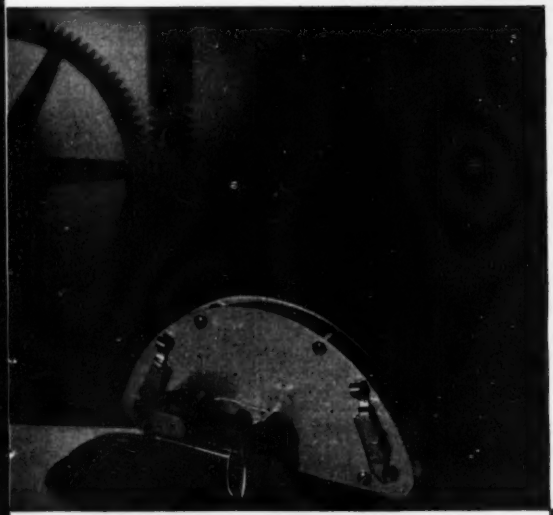
What would YOU like to know about metering?



Would you like to know how modern meters can promote good public relations?

Would you like to know how accurate meters facilitate fair pricing? How dependable meters can reduce operating costs? And, how well-designed meters save operating and maintenance expense for your company?

If you are interested in the answers to these and many other questions, get your copy of "Metering for Profit." It's yours for the asking.



WHAT IS A SHADOWGRAPH? This illustration, from "Metering for Profit," shows the magnifying device used to assure an exact adjustment of the mesh between the worm spindle of a meter disk and the worm wheel of the register. The use of the shadowgraph is another step to assure that your meters register fully all kilowatthours consumed.

Only Measured Facts are Known Facts

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

Write for "Metering for Profit"

A non-technical report to utility company personnel concerning watthour meters. If you are interested in metering and its effect on profits, it should be "must reading." The coupon will assure you of a copy.

IT'S FREE!

SANGAMO ELECTRIC COMPANY, SPRINGFIELD, ILLINOIS

Please send my free copy of "METERING FOR PROFIT"

YOUR NAME_____

TITLE_____

COMPANY_____

CITY and ZONE_____ STATE_____

SM52-11

T&B METHOD
Fittings and Tools for ALUMINUM and Copper Conductors

FOR ACSR & ALL ALUMINUM CABLES

Tension Splicers

Dead Ends

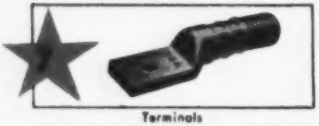
Jumper Splicers

Repair Sleeves

Light Portable Tools (for tower work)

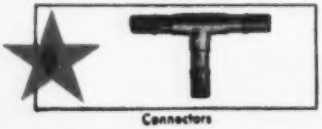
FOR UNDERGROUND & INDOOR INSTALLATION

Splicers



Terminals

Taps



Connectors

Tight, sound connections every time with T&B Method Aluminum Terminals for aluminum cable

Serrations inside the terminal barrel scrape the oxide off the aluminum cable. Tremendous pressure exerted by lightweight T & B tools rubs the metal clean—compresses the stranded cable to the equivalent area of solid rod—squeezes the air out of the cable—and permanently seals it against corrosion! L-o-n-g contact of barrel to cable counteracts tendency to cold-flow. *No joint compound needed.*

YOU GET THEM EVERY TIME BECAUSE . . .

The high-conductivity, ductile aluminum barrel flows readily under compression—and the dies exert just the *right* amount of compression. Die code number stamped on every barrel assures use of correct die—and marking shows exactly where to place the die on the barrel. Once the dies have closed, the job is *sure* to be right.

ENGINEERED RIGHT . . . DISTRIBUTED RIGHT

T & B Method fittings and tools, like all T & B quality fittings, are designed for lowest installed costs. They're furnished exclusively through local T & B distributors under the T & B Plan.

FROM CIRCLE TO HEX IN SECONDS

You start with a circular cable (a typical one consists of about 75% metal, 25% air). You compress it, by the T & B Method, to the equivalent area of a solid rod—as the dies force the fitting from circular to the characteristic T & B Method hexagonal shape—all in the space of just a few seconds!

FOR THE FULL STORY ON THE T & B METHOD, WRITE FOR BULLETIN 67

THE THOMAS & BETTS CO.

INCORPORATED

35 Butler Street
Elizabeth 1, New Jersey
Thomas & Betts, Ltd., Montreal, P. Q., Canada

THERE'S A T&B ENGINEERED PRODUCT for every wiring job in the complete T & B line of fittings for all conductors and raceways

Manufacturers of Electrical Fittings

The Reader AUDITED PAID CIRCULATION ABC *His Mark*

THE ABC SYMBOL which is printed at the head of this page is, in a very real sense, *your* brand on this magazine. Those letters stand for Audit Bureau of Circulations. The symbol indicates that the magazine is a member and supporter of that Bureau.

To the advertiser who contemplates using the magazine as an advertising medium, this symbol has a well-recognized significance. It tells him that the circulation records and practices of the magazine are wide open to the auditors of the Bureau, who check the publisher's claims and make public the precise terms and conditions under which subscriptions are obtained. And it assures him that the magazine stays in business by virtue of a demonstrated demand from its readers as shown by their paid subscriptions or newsstand purchases.

BUT HERE we are concerned only with the significance of ABC to you as a reader. For when the advertisers, the advertising agencies, and the publishers founded the Bureau nearly forty years ago to help establish honest circulation figures, they unwittingly set up a cooperative institution that has become a major safeguard for the interests of the reading public.

That is because membership in ABC constitutes one of the strongest guarantees that any publication can offer of its primary devotion to the interests of its readers. And by making that guarantee possible, ABC becomes a major safeguard of the freedom of the press, an objective of exceptional importance in these days when the public is flooded with propaganda from so many sources.

THE SUREST MEANS by which to preserve a free press is to keep it directly answerable to the reading public it would serve. It follows, then, that the survival of a truly free press must depend on its acceptance by that public; and that means in turn that the people must have in their hands some adequate means for holding the publishers responsible to them.

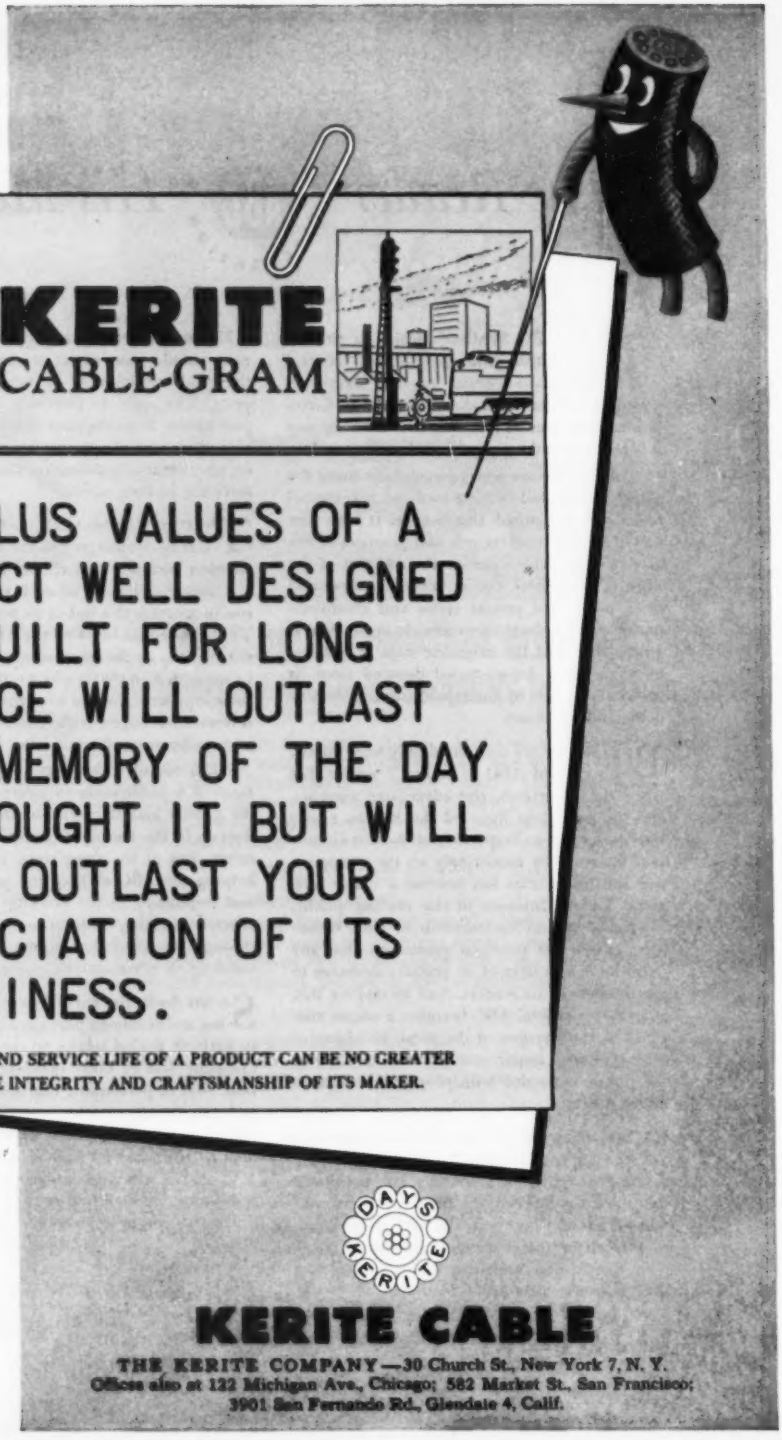
No one has yet devised any means to that end more simple, more direct or more practical than the paid subscription or newsstand purchase price. The right to purchase or refrain from purchasing a publication gives to the readers and to no one else the power to pass judgment on whether that publication should continue to serve the reading public.

TO SUPERVISE this vital process, to check and certify the integrity of the publication's circulation methods and claims, requires a strict and continuing audit of each publication's success in meeting this test of its public acceptance. To that essential function the ABC has contributed mightily by the conscientious performance of its mission. And that is why we are able to have a press supported, for the most part, by advertising revenues, but not controlled as to its circulation or content by any influence other than its readers.

When an advertiser consults the ABC statement of a publication to ascertain the amount, the quality and the trend of its circulation, he does so in the legitimate pursuit of his own interest. But at the same time, inevitably, he is helping the ABC to keep the press responsible and responsive to the reading public. For, in effect, he is asking the publication to demonstrate through its circulation figures that it owes its standing to a voluntary demand by its readers.

SO THE Audit Bureau of Circulations, by auditing and certifying paid circulations, has come to perform a vital service to the readers of this magazine and of every other member publication. And in performing that service, it helps to maintain in our country a press that is answerable to the reading public and to it alone. So long as the practices and principles for which ABC stands continue to prevail in American publishing, we shall find in it a sure support for a truly free press, responsible only to the public it serves.

McGraw-Hill Publishing Company


KERITE
CABLE-GRAM
THE PLUS VALUES OF A PRODUCT WELL DESIGNED AND BUILT FOR LONG SERVICE WILL OUTLAST YOUR MEMORY OF THE DAY YOU BOUGHT IT BUT WILL NEVER OUTLAST YOUR APPRECIATION OF ITS WORTHINESS.
THE VALUE AND SERVICE LIFE OF A PRODUCT CAN BE NO GREATER THAN THE INTEGRITY AND CRAFTSMANSHIP OF ITS MAKER.
DAYS KERITE
KERITE CABLE
THE KERITE COMPANY—30 Church St., New York 7, N. Y.
Offices also at 122 Michigan Ave., Chicago; 582 Market St., San Francisco;
3901 San Fernando Rd., Glendale 4, Calif.

EDITORIALS

Breaking Up The Biggest Monopoly

(Extracts from the address by Charles E. Wilson at the meeting of the Commerce and Industry Association of New York, Sept. 16, 1952)

"Not too many decades ago, we lived through a period of trust-busting to break up the big monopolies. We acknowledged then that the concentration of power did not always work for the best interests of America. But have we forgotten? If we have, then it is time to remember.

"If the concentration of power by business was bad for our country—and it was—then the concentration of power by government must be equally bad.

"Man's struggle through the ages, beyond that against hunger, has been against being pauperized and enslaved by his government. In only a few brief moments of history has man been free and well off, as here in our blessed land.

"Abraham Lincoln observed that no nation could survive half free and half slave, and the people of the United States well understood what he meant. They fought a war; and because they did, we were united and put on the road to greatness. Now, in business, we are approaching a sort of half-freedom and half-serfdom, and I submit that no nation can survive under that kind of system, either.

"If Americans still believe in their system, let's start practicing that belief.

"Our national debt today is approaching $270 billion. Suppose we could cut that by about 10%. I know there will be many who will minimize a mere 10%—just an insignificant 27 billions—but if we could make that cut, we would save annually almost half a billion in interest payments. This saving is not the main purpose of the proposal at all, even though the monies involved are considerable.

"The purpose is to let all Americans, who can and will, buy a share of stock in America of their own free will—to make them stockholders in the true sense of exercising both choice and control. The public power and water projects and similar enterprises that we have built are book valued at approximately 10% of our national debt. They are sound and going businesses, and they are serving an important public need. We have never argued the need—just the method. But they are operating under the big government concept, which has never in history proved itself an intelligent and efficient operator of any business.

"What is wrong with selling our national dams, generating equipment, and distribution facilities to the people? Immediately this will be attacked, I know, by a lot of those people who will say that we are thereby trying to give these facilities to Wall Street.

"Not at all. The potential buyers are all around us. They are exactly the millions of our fellow Americans we want to reach, the same people who need to learn about and understand the true democracy and strength of the American competitive system. They are the people who own government bonds.

"Under this plan, bonds could be exchanged for shares of stock in the new companies to spring from the presently government-owned plants. It would be deflationary to the extent that the debt is reduced. Instead of tax-free power and water projects, the new companies would pay taxes approximating a billion yearly. And if they are economically justifiable undertakings in the first place, this will prove that they are; or the potential investors will simply not invest their savings. And the new shareholders would get a better return from their stock than they are getting from their bonds today.

"But most important of all, the people would be buying into business. Millions would own a tangible part of American Business Enterprise, and as owners these millions would have an interest, sense of proprietorship, and responsibility not otherwise possible. They would acquire a personal interest in business. They would be buying economic understanding in the only good way, as voluntary participants, and that is all we ask. Then they would understand, and no longer could the misguided few so easily steer us down the course of nationalization, socialism or collectivism.

"If that happens, gentlemen, the second era of trust-busting will be automatic. The people will break up with violence the most insidious monopoly of all, the out and out economic dictatorship of a few politically powerful men who are over-riding your desires and mine, men who are holding the very destiny of the country in their hands."

An Editorial on Joe Blatz

Joe Blatz is 44 years old. He is married and has six children. His education ended when he flunked in the fourth grade. He has never earned more than $200 a month. Most of the time he has never earned that because he is allergic to work. Often when he has been in jail for drunkenness and disorderly conduct, his family has been on relief. No electric utility would hire him but that doesn't bother him a bit. He manages to get along somehow. He has electricity in his $30-a-month home, but his annual usage is less than 300 kwhr a year.

Why is Joe Blatz so important that he should be the subject of an editorial? Here is why: Joe is a registered voter. On election day he will vote unless he is in jail. And his vote will be equal in value to that of the minister, the chief of police, the college professor, or the utility company president. Yes, Joe will vote, but will you?

Sell—and Sell—and Sell

This year the people of the United States will pay almost twice as much money in taxes as they spend for food. Only a vigorous, growing economy can hold up under such a tax load. And it will be "such a tax load" for many years to come. No administration in Washington can do any more than lighten the burden a little.

Therefore, we must see to it that a vigorous, growing economy is maintained. There can be no letdown. Assurance against letdown can come only from the same force that has raised our standard of living to the highest level the world has known. This force is selling—selling that makes people dissatisfied with what they have and makes them want something better, selling that awakens desire for new things.

No industry holds out more promise of new and better things than does ours. The electrical age is only at its beginning in lightening labor and in providing amenities of living. Because of this promise, because it has so much to sell, a special responsibility devolves on the electrical industry to keep our economy healthy, to accelerate its growth, so that our generation and those that follow can carry the tax load that cannot be escaped.

Helping Junior Achieve

October is the traditional time for burning leaves, consuming cider and doughnuts, and seeing the children once more in the routine of going to school. But for private business across the country the reopening of school provides another opportunity to show the real meaning of free enterprise to American youth. October is the month that the Junior Achievements program is set in motion.

Through Junior Achievement, groups of high school students learn by actual experience how to manage a business venture. With guidance in production, sales, and management provided by a sponsoring business firm, each group installs company officers, decides upon a product, and issues non-legal, non-transferrable stock worth 50¢ per share. With the capital raised the students buy raw materials. They explore the best and cheapest means of making and marketing the product. Company policies affecting wages and salaries, product improvement, and selling methods are decided by the board of directors, which consists of all the students. At the end of the school year the company is liquidated, and the original investment plus any dividends are returned to the stockholders along with an annual report.

During the last school year some 18 power companies were sponsors of Junior Achievement programs, and this year openings exist in many cities for power companies to become sponsors. A look in the telephone book or a letter to Junior Achievement, Inc., 345 Madison Avenue, New York 17, N. Y., is all that is necessary to become a sponsor.

Shakespeare Said It

Is money paid for electricity more valuable, harder to come by, than the mazuma cheerfully laid on the line for round steak at $1.15 a pound?

Yes, it is. Anyway, most people think it is. That's the reason the public power lads are sure of an attentive ear when they shout about "cheap" electricity.

Proof of this interesting quirk in human nature comes from a story in the August issue of Electrical Merchandising. A Zanesville, Ohio, appliance dealer offered free electricity to operate it for a year with every range sold in the month the offer was open. The deal was restricted to ranges selling for over $250. The buyer got a price cut of $25.50, which is the amount paid in Zanesville for 1,020 kwhr, average annual usage of a range.

The promotion was very successful, much more so than previous sales efforts featuring 25% off.

Looks like Shakespeare was right when he wrote, "Lord, what fools these mortals be!"

How Much Is Too Much Sales Promotion?

The Public Service Commission of Utah has raised the question of placing a ceiling on sales promotion expense in its July 29 order concerning a rate increase for Utah Power & Light Co. It seems that the commission staff found from a study of 32 electric utilities that their average sales promotion expenses were 1.83% of total electric operating revenues and advertising expenses were 0.46% of electric operating revenues. For Utah Power & Light Co they found expenditures to be 2.63% and 1.01% respectively.

With these comparisons as the basis, they concluded that, "It appears from the evidence—that applicant has been exceedingly generous in its expenditures for sales promotion and advertising purposes and in the payment of dues to various organizations. In our opinion these expenditures could be reduced without imparing the over-all sales activities of the company."

This presents a serious threat to the Utah Power & Light Co. To prevent future problems of this nature we suggest that the 32 companies take a look at the probable inadequacy of their sales promotion programs. They may be 0.80% too low, which is the difference between what Utah Power & Light spends and the average of the others.

As a suggestion to the Public Service Commission we recommend that action of this sort be based on something more tangible than statistical comparisons. The electric utilities as a whole have not been doing anything like an adequate promotional job in the last few years. They will be the first to admit it. And as a further precautionary comment, variations in items charged to sales promotion expense accounts deny validity to such comparisons.

THE ELECTRICAL WEEK

The Issue's News Highlights—National public power groups meet with New York State Power Authority in the hope of having a preference clause written into the state's plans for marketing St. Lawrence power.

Depa puts utilities in the Pacific Northwest on notice that an order limiting firm power may be forthcoming from the agency at any time, depending on water conditions in the area.

Latest from Washington—Interior Department files 234 page brief with Supreme Court in Roanoke Rapids case. No decision is expected until after election . . . Depa Administrator James F. Fairman will probably return to Consolidated Edison before Christmas, turning his Depa job over to new Deputy James F. Davenport of Southern California Edison . . . Electric utilities used a record 104 billion cu ft of gas during August.

TVA has turned off 96,000 kw of its interruptible power to aluminum plants in its area because of water situation there. The agency could bring in power from other areas, but cost is considered excessive for aluminum production . . . REA makes loan of $1.2 million to Ozarks Rural Electric Cooperative Corp., Fayetteville, Ark., to finance distribution lines and system improvements.

At Hungry Horse Dam dedication ceremonies in Montana last week, President Truman accused General Eisenhower of turning against public power after learning "the Republican line." He said, "It will be a long time before you see another structure of this kind" if Eisenhower is elected.

From East North Central—Ohio PUC gives Ohio Edison and Columbus & Southern Ohio Electric permission to exchange properties in central Ohio.

From West North Central—Missouri Utilities is negotiating to sell Paragould, Ark., properties to City Commission and remainder of its Arkansas system to Arkansas-Missouri Power Corp.

From the Southeast—Florida Power Corp., including its subsidiary Georgia P&L, says it is fastest growing electric utility of 100 largest utilities in US, based on percentage increase in customers from 1946 through 1951 . . . Georgia Power Co hits record peak of 1,254,920 kw on Aug. 19 because of heat spell; previous peak 1,182,750 kw on Dec. 19, 1951.

From the Far West—Pacific P&L buys entire distribution system at University Homes, Portland, for $55,160 . . . Effect of PUD purchase of Puget Sound P&L on City of Tacoma will be discussed at a meeting between J. Frank Ward, Tacoma City light superintendent, and six-district PUD executive committee. Date of meeting has not been set . . . Both Pacific G&E and USBR have presented contracts for power delivery to Alpaugh Irrigation District in California's southern Tulare County, but the district has not yet accepted either. The district is now a PG&E customer.

Construction—Pennsylvania Power Co spins new 85,000-kw unit at New Castle steam plant, bringing it up to 173,000-kw . . . Arizona Public Service plans to spend $125 million in next 10 years for expansion.

Financial—General Public Utilities' stockholders get letter from Pres A. F. Tegen telling them they can round out their holdings to nearest multiple of 10 shares without any brokerage costs. They were also told that if they owned nine shares or less, they can sell them through GPU without brokerage costs or transfer taxes.

American Waterworks & Electric (liquidated) stockholders will receive an additional $10 a share on preferred stock, making a total of $110 which U. S. District Court Judge Paul Leahy says was arrived at "in accordance with legal standards and is supported by substantial evidence when the whole record is considered."

Litigation—Kentucky Court of Appeals is hearing dispute about whether East Kentucky Electric Cooperative Association, now building $30 million steam plant at Ford, should be permitted to build 597 miles of transmission lines. Kentucky Utilities Co contends lines will be duplicating its lines. K&U's Attorney Squire Ogden suggests that East Kentucky and KU sit down and work out a plan to distribute the power to be generated at the new plant.

Rates—Denton, Tex., City Commissioners increase first step of 30 kwhr from 6¢ to 7 2/3¢ per kwhr. Rates for larger users will remain unchanged . . . Idaho Power gets rate hike of about 11% from Idaho and Nevada PSC's.

British Columbia Electric gets PUC approval to increase its allowable rate of return from 5.8% to 6.5%. W. S. Mainwaring, vice president of BCE, says "Commission's decision to set our rate of return at a ceiling of 6.5% instead of requested 7.5% is quite a disappointment."

Blaming high cost of steam power, rates in Ontario will be increased Jan. 1, says Robert Saunders, chairman of Ontario Hydro. "But it certainly will be under 15%."

Congratulations—Southern California Edison promotes George N. Hawley from assistant to president, to vice president, succeeding R. C. McFadden, who will retire Nov. 1. Joseph R. Brookshire is named assistant to president . . . Allis-Chalmers Manufacturing Co appoints J. D. Greensward director of manufacturing of General Machinery Division, succeeding Fred Mackey, vice president of this division, who has resigned.

Phelps Dodge Copper Products elects Howard T. Brinton president, succeeding Whipple Jacobs, deceased. Company also elects W. J. Palmer vice president in charge of manufacturing . . . Chase Brass & Copper elects Walter L. Smith vice president in charge of operations.

Obituary—Merlin Hall Aylesworth, 66, one-time managing director of former National Electric Light Association, in New York City on Sept. 30.

Public Power Asks N. Y. Preference

- **NRECA and APPA, meeting with New York Power Authority, seek assurances that cooperatives and municipals will get first chance at power produced at St. Lawrence project**
- **Authority, though hesitant to embrace federal clause, hopes to reach 'common understanding' with the two groups before its license application comes up at FPC hearings**

New York Power Authority and two national public power groups met last week in New York City to try to reach a common understanding on the authority's plan for developing the St. Lawrence power project. None was reached.

With Rural Electrification Administration chief Claude R. Wickard sitting in, top-ranking representatives of National Rural Electric Cooperative and American Public Power associations tried, among other things, to convince authority members that some form of preference clause should be written into the plan.

After the meeting, John W. Burton, power authority head, said his agency always had been reluctant to talk about preference.

"What we're after is to get a Northeast power pool with complete integration. You can't get complete integration without the private companies."

Authority Stand . . . He explained that the federal concept of preference would hinder integration in the Northeast because transmission lines would have to be built directly to preference customers—the cooperatives and municipals—at the expense of heavying up power lines in the existing private-company network.

Wickard, Clyde T. Ellis, NRECA executive manager, and Alex Radin, APPA general manager, all refused comment on the meeting. Radin, however, did say APPA might possibly intervene in the pending St. Lawrence hearings before the Federal Power Commission, "if the interests of its members need to be protected."

New York Power Authority reapplied to FPC in August for permission to build the American half of the proposed dam at Massena, N. Y., after Congress killed a bill authorizing federal participation in the seaway and power project (EW, June 23, p 15; Aug. 11, p 110). In 1950 FPC had turned down the original application on the grounds that Congress should decide how the country should participate. Now it appears likely that FPC will go along with the authority's request.

Whether the public power groups will oppose granting a license to New York when the hearings begin depends on whether they are satisfied with the assurances they get from the authority at these private meetings.

"If any common understanding can be reached," Burton commented, "we certainly would like to do it before the hearings are ended. I'm in no position to say at this time what conclusion we are going to arrive at."

No Date . . . He said no specific date had been set for another conference with the public power group. Nor has any been set for the hearings before FPC.

If the power authority refuses to grant the co-ops and the municipals some form of preference, these groups could ask FPC to write such a clause into NYPA's license. But FPC would be breaking long-established precedent if it did this.

The power project must also be approved by the International Joint Commission, which has been holding hearings on its feasibility.

In recent NRECA regional meetings at Bedford, Pa., and French Lick, Ind., Ellis told delegates that New York State had indicated it wanted no part of any preference clause arrangement.

"We found . . . that we had no alternative," he said, "but to still urge that the New York Power Authority be left out of the picture and that the Department of the Interior be directed to distribute [St. Lawrence] power under the general law.

"However, we nevertheless agreed that we should also urge the Federal Power Commission to write the usual preference clause into any license it might grant in connection with the project should New York be authorized to go ahead."

NRECA filed a 16-page statement with the Joint Commission, outlining its views. Shortly afterward, the public power groups agreed to meet with the New York authority and discuss the matter.

About 125 municipal systems and six rural electric cooperatives would stand to gain by getting first chance at power in the St. Lawrence marketing area. The municipals sold about one billion kwhr last year.

American share of energy produced at the 940,000-kw St. Lawrence plant has been estimated at about six billion kwhr a year.

Florida Grid . . .

. . . is proposed by FPC to interconnect the electric systems of four utilities in state

A transmission grid connecting the electric systems of four large Florida utilities is being proposed by Federal Power Commission.

Copies of the FPC plan has already been sent out to interested parties in the state including the utilities involved, the State Public Utilities Commission and the Governor of Florida.

Under Section 202 of the Federal Power Act, the commission is authorized to promote the voluntary interconnection of systems when such action is deemed in the public interest.

If accepted in full, the proposed grid would mean interties between the following systems: Florida Power Corp, Florida Power & Light Co,

'World' Development

The latest developments in news and engineering will now be found in the 30-page section that begins with The Electrical Week, p 83. Washington Comment and Technical Notes columns, will now be found on Page 109. Statistics will be found on Page 110 and the Financial Department on Page 111.

Tampa Electric Co. and Jacksonville Electric Department. The connections would be 120 kv or 66 kv transmission lines. The smaller voltage would accommodate Tampa Electric Co, which sees no need of raising the maximum capacity of its present transmission system.

Interest in Plan . . . One tie line south of Lake Okeechobee and several tie lines north of the lake are a part of the proposal. Representatives of the utilities have discussed the matter with the FPC regional office in Atlanta. At least two of the utilities concerned have expressed a deep interest in the proposal, and system load tests are now being carried on by the utilities.

While the FPC proposal does get down to brass tacks as far as the lines are concerned, the utilities concerned will have an ample opportunity to comment on each part of the proposal. They may suggest possible alternative tie lines, or they may reject the interties entirely.

Thus far the City of Jacksonville has shown little desire to connect its transmission system with other systems in the state. There are a number of small systems in the state which are still operating independent of interties. Among these are the City of Orlando and several rural electric cooperatives.

Depa May Limit NW Power

Agency notifies utilities in the area that such an order may be necessary if water conditions become worse

Electric utilities in the Pacific Northwest are on notice that Defense Electric Power Administration may envoke a power limitation order at any time.

All preliminary steps have been taken, and the order will go into effect if and when Depa determines that water conditions are sufficiently serious to demand further power curtailment.

However, Depa last week emphasized that the order had not yet been officially issued, and steps taken thus far are to be considered no more than preparatory.

Industry Letter . . . In an industry letter sent to utilities in the area, Depa Administrator James F. Fairman submitted a rough draft of the limitation order for the purpose of enabling utility officials to be ready for operation under its provisions if it becomes necessary.

The order is patterned generally after the EO-4 order issued last year for utilities in the same area. Principal changes include:

- Elimination of a list of prohibited uses of electricity, and reliance, instead, upon voluntary action to reduce consumption.
- Elimination of governmental directions for shedding interruptible loads.
- Raising from 4,000 to 8,000 kwhr a week the figure below which the compulsory curtailment provisions do not apply. Curtailment of firm load will be made so far as possible only after all interruptible loads have been shed.

Interruptible loads of most large industrial customers have been off for several weeks. This means that paper, aluminum and other metal producing plants have been forced to cut back schedules.

Also included in the letter sent to Pacific Northwest utilities is a new form, DEPA-30, on which utilities will inform their large customers the amount of energy to be allowed should the curtailment order be issued. This is to be based on the amount of power each customer consumed during the 1951-1952 water storage season, which runs from October through April.

Curtailment Put Off . . . There probably will be no curtailment of firm power in the Northwest at least until the middle or latter part of October.

Bonneville Power Administration officials said last week the general plan of the utility conference committee (a group made up of the seven members of the Northwest Power Pool), is that even on the basis of minimum water conditions there would be no further cuts in the power until that time. The officials said, however, that a three-inch rain over the region could change the situation and might even allow restoration of the interruptible power already cut off.

Meanwhile, aluminum companies in the Columbia River area still are losing aluminum production at the rate of about 395 tons a day.

When interruptible power was cut off early in September, production of aluminum in the Northwest was about 440,000 tons a year, of which 145,000 tons was being produced with interruptible power.

PSE&G Puts 132-Kv Under Lake Dundee

Public Service Electric & Gas Co recently installed a 1,000-ft section of 8-in. welded steel pipe line on the bottom of Dundee Lake between Garfield and Clifton, N. J. By midwinter the pipe will house one of the underwater sections of a 132-kv transmission circuit that will connect Athenia Switching Station in Clifton and Bergen Switching Station in Ridgefield Park. Here the pipe is shown lined up in 200-ft lengths on the bank prior to being welded together and drawn across.

Information Committee Set Up

Seven-man group, sparked by NRECA, aims to carry out principles laid down last May at Electric Consumers Conference

A seven-man committee has been established in Washington to carry out the principles adopted last May by the public power-minded Electric Consumers Conference (EW, June 9, p 9).

Known as the Electric Consumers Information Committee, the group is represented as a loosely-knit coordinating committee which meets once a month to discuss electric power matters. As a part of its information program, it has also issued one pamphlet and made available a number of recordings calculated to sell the public on federal power development.

Seventeen organizations — public power, agricultural and labor—sponsored the Electric Consumers Conference last May, and seven of those are represented on the information committee.

Active Role . . . National Rural Electric Cooperative Association, lobby group for the power cooperatives, appears to be taking the most active role in the committee. Clyde T. Ellis, NRECA executive manager, is chairman of the committee. Clay Cochran, another NRECA employee, is coordinator for the committee. The headquarters of the group are located in the building occupied by NRECA.

Other committee members include: Alex Radin, vice-chairman, who is general manager of American Public Power Association; Dewey Anderson, secretary-treasurer, who is executive director of the Public Affairs Institute; Anthony Wayne Smith, executive secretary of the CIO committee on regional development and conservation; Robert G. Lewis, director of publications for the National Farmers Union; Wallace Campbell, director of the Washington office of the Cooperative League of the USA; and George Brooks, director of department of research and education of the International Brotherhood of Pulp, Sulphite and Paper Mill Workers of America, AFL.

Policy . . . A policy statement adopted by the committee reads in part:

"None of the officers, directors, members or employees of the Electric Consumers Information Committee shall engage in lobbying or other activities in the name of the committee. Since the function of the committee is the exchange of information within the committee on electric consumption matters, it is presumed that this shall be its sole function. . . ."

The committee has published an 80-page report on the May conference. Entitled "The People's Fight for Low Cost Power," copies are available from the committee at 1303 New Hampshire Ave., N. W., Washington 6, D. C. for 25¢ each.

There has been some discussion recently that another conference will be called next spring, but no definite date has been set.

Falcon Power Bid

Interior wants to market U. S. portion of energy from dam on Rio Grande

Interior Department is bidding for control of the U. S. share of power to be produced at Falcon Dam on the Rio Grande River.

Constructed by International Boundary and Water Commission of the U. S. and Mexico, the two 31,500-kw power plant at the Falcon project are slated to go into operation next fall (EW, March 17, p32). But Congress must designate a marketing agency to sell and transmit the power which is to be marketed in the U. S.

How Falcon power goes will probably determine how power will go at two other federal dams authorized on the Rio Grande.

In El Paso last week, Commissioner Lawrence Lawson said that while the dam was 70% built, its completion will probably be delayed because of a slowdown in delivery of material and equipment. No companies or cooperatives in the area, he said, have as yet put in bids for power from the dam, which is chiefly for irrigation.

A bill that proposed Bureau of Reclamation as the marketing agency was introduced early this year, but it died in committee. The same kind of bill will probably be re-introduced at the next session of Congress.

The Terms . . . Under its terms, the bureau would market the power on the same basis as it now sells power from its own projects. Public agencies and cooperatives would get first priority, and the agency would seek funds to build transmission lines to serve these preference customers. Any remaining power would be sold to electric companies.

State Department sources have indicated there may still be a chance of selling the power at the bus bar, but this possibility has not been discussed at policy level. Except for the bill introduced this year, there appears to have been little effort made to nail down a marketing agency for Falcon power.

The 1944 treaty, which fixes the rights of the two countries in connection with the Falcon project, provides that power from the project is to be shared equally. Total output from both plants is estimated at 200 million kwhr of prime energy and 50 million kwhr of secondary energy. The treaty provides that either nation may sell to the other energy not required for its own use.

Mexico Undecided . . . It appears now that Mexico will not be able to use all of its share of the energy when the turbines begin spinning next year. This will give the U. S. marketing agency a larger block of power to dispose of until Mexican requirements increase.

Mexico has not yet decided exactly how much of the energy it will be able to use during the next ten years. But there probably will be some determination on this score by the time a U. S. marketing agency is designated.

Gentle Hint, Perhaps

It seemed a little incongruous. Members of the Chandler, Ariz., city council passed by candlelight an ordinance granting Arizona Public Service Co a 25-year franchise to provide electric service. In the nearby town of Gilbert, members passed a similar ordinance by the light of a lantern.

It was no prank. While they were meeting, power furnished by Arizona Public Service failed when a jumper circuit burned out atop a substation.

CVP Pact Signed

Reclamation and the Colorado River Commission of Nevada complete 33,000-kw deal

Bureau of Reclamation recently announced in Sacramento, Calif., that it has signed a contract with the Colorado River Commission of Nevada making available 33,000 kw of California's Central Valley Project hydro power capacity for defense industries in southern Nevada and government preference customers in the Reno area.

However, the contract, which calls for payment of 5 mills per kwhr at a 50% load factor, specifically sets up a restriction which it is believed the Nevada commission will be unable to meet—Nevada must arrange before next June 30 to transfer and firm the power from the CVP load center near Tracy, Calif (EW, Sept. 15, p 21).

At the same time it was revealed that the bureau is negotiating for sale of CVP power to the City of Los Angeles.

Won't Interfere . . . Richard L. Boke, regional director for the bureau, said allocation of power to Nevada would not interfere in any way with "current negotiations to provide low-cost CVP power to the Sacramento Municipal Utility District, the City of Los Angeles, or other government preference customers in California."

He revealed that representatives of the Los Angeles department and bureau officials will meet again in about a month. The bureau-SMUD negotiations are approaching a showdown.

SMUD, also negotiating with Pacific Gas & Electric Co whose contract expires June 30, 1954, has asked that each submit a tentative power contract by Oct. 20.

SMUD officials will study the offers and when the SMUD board of directors meets in Sacramento, Calif., Oct. 30, a decision will be made on which offer the utility wants to pursue, that of the bureau or that of the PG&E.

SMUD asks for an initial block of 290,000 kw with supplemental power to be made available over a period of years. PG&E already has agreed to wheel power to SMUD if the bureau successfully negotiates a contract with the Sacramento public utility.

They Saved the Coulee Generators

As water shot up through this 30-inch shaft opening inside Grand Coulee Dam, these three men waded waist-deep through the gallery to a cut-off valve to stop the flow from reaching the huge dam's generators. Left to right: Milton L. Berg, Donald D. McGregor and Norman G. Holmdahl. The near-disaster happened March 14 when a giant outlet valve was opened inadvertently and water pressure tore loose the cover to the inspection shaft. Late last month Bureau of Reclamation honored the three engineers and five others who helped with its Gold Medal Distinguished Service Award.

Depa 1st Q Allotments Top Those for 4th in '52

Except for carbon steel, first quarter 1953 minor requirements allotments for electric utilities are generally above those for the fourth quarter of the present year.

Advance minor requirements allotments for the remaining quarters of next year also are generally higher than advance allotments granted this year.

Defense Electric Power Administration has announced the allotments for first quarter 1953 will amount to approximately the following percentages of the metals actually used during a corresponding quarter of 1952:

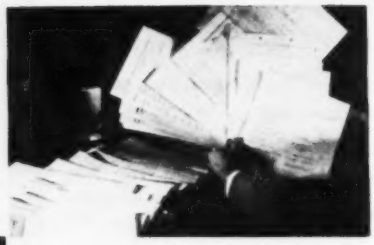
Aluminum	90%
Copper	60%
Carbon Steel	56%
Alloy Steel	75%
Stainless Steel (Nickel-bearing only)	75%

These controlled material allotments cover aluminum, copper, and various types of steel to be used by utilities for maintenance, repair, and operation of their systems. They do not include metals which are to go into major plant additions.

2 Missouri Basin Plants Acquired by Reclamation

To further extend its control over power activities in the Missouri River Basin, Bureau of Reclamation has acquired full title to two small hydroelectric plants and a 222-mile transmission system which are a part of the North Platte, Wyo., Reclamation project.

In return for a $6,635,000 credit to four irrigation districts, the bureau obtained the right to all future revenues from the 1,400-kw Lingle Plant, the 4,800-kw Gurnsey Plant, and the 222-mile transmission system which carried power from these plants. Also involved in the deal was the right to further develop the plants and certain other facilities held by the four irrigation districts.



Over four years' study by members of the subcommittee of ASA for Power and Distribution Transformers, working with 158 correspondent-advisers, has resulted in the accepted new standard (57.12a) which includes the transformer kva ratings of Proposal C shown in table ➔

Power Transformers Now Covered by New

For many years there has been in existence an American Standard (C57) for Transformers, Regulators, and Reactors. This standard applies to all ratings of distribution and power transformers, and many of the specifications are of a broad general nature. Additions or changes of specific paragraphs are made from time to time but only as the need becomes evident and general agreement on the proposal can be obtained.

Faults in the General Standard . . . A number of essential elements and details generally required by customers are missing from or incompletely specified in the general standard.

Among the major deficiencies of the general standard is the absence of standard voltage ratings, tap voltages, and tap range. Also, the only specification regarding impedance is a permissible tolerance for certain conditions. Such impedance specification is of little value. Another defect is the lack of specifications pertaining to accessories and mechanical features.

Recognizing the need for a more satisfactory standard, a joint committee of the Edison Electric Institute and the National Electrical Manufacturers Association was organized in 1938 to develop specific standards for distribution transformers. The first report of this committee published in February 1940 established design standards for certain mechanical and electrical features for the lower voltage and kva range, single-phase, pole-type distribution transformers. Subsequent reports of this committee have extended the standardization.

Scope of the New Standard . . . The success of the joint EEI-NEMA committee in developing standards for distribution transformers prompted the ASA Sub-committee for power and distribution to undertake the development of specific standards for power transformers. This project started over four years ago and culminated in a recently published proposed standard (C57.12a) for power transformers.

This new standard applies to 60-cycle, two-winding, mineral oil-filled transformers rated 501 to 5,000 kva inclusive, single phase; 501 to 10,000 kva inclusive, three-phase; high voltage 2,400 to 67,000 v inclusive; low voltage 480 to 14,400 v inclusive, generally for step-down purposes.

Why Standardize Power Transformers? . . . The general advantages of standards and their influence in reducing cost, simplifying specifications, improving design, etc, has been told in considerable detail in previous articles[1].

[1] "Constructive Standardization Typified by Transformer Program"—Electrical World, Dec. 3 and 17, 1949.
"Standardization by Electrical Manufacturers"—AIEE Miscellaneous Paper 48-135 (1948).
"How Big is an Inch?"—Atlantic Monthly, January 1951.

Proposals For Standard Kva Ratings For Three Phase Power Transformers

Present Standard		Proposal A		Proposal B		Proposal C		Proposal D	
Kva	% Step	Kva	% Step	Kva	% Step	Kva	% Step	Kva	% Step
750		750		750		750		750	
	33		33		33		33		33
1000		1000		1000		1000		1000	
	50		50		50		50		50
1500		1500		1500		1500		1500	
	33		50		50		67		67
2000		2250		2250		2500		2500	
	25		33		33		50		60
2500		3000		3000		3750		4000	
	20		25		25		33		50
3000		3750		3750		5000		6000	
	25		33		33		50		67
3750		5000		5000		7500		10000	
	33		50		50		33		50
5000		7500		7500		10000		15000	
	20		33		33		50		
6000		10000		10000		15000			
	25		20		50				
7500		12000		15000		Proposal C			
	33		25			adopted			
10000		15000							
	20								
12000									
	25								
15000									
Kva's	13		11		10		9		8
Avg. % Step	28.5		35.2		39.7		45.8		54

American Standard

E. V. De BLIEUX, Deputy Chairman, ASA Subcommittee on Power and Distribution Transformers

The question may be asked: Why was this particular group of power transformers chosen for standardization? The answer is: Standardization is of greatest advantage where the volume is large, and the power transformers covered by this new standard represent the largest volume group. Also this area of ratings and kva's is most susceptible to standardization.

Standards to be successful must have wide acceptance and be usable by most, if not all, operators. Many users of power transformers are accustomed to preparing detailed specifications for those they purchase. Many have felt that this is necessary to ensure that the transformer fulfills the requirements of their operating system.

Based on the experience with standardized distribution transformers, it is believed that power transformers in accordance with this new standard will be adequate for most applications and will eliminate for the purchaser the work of preparing detailed specifications. The smaller sizes of power transformers of all makes have for a number of years had many features in common. This is not surprising because engineering economics, the major determining factor, is the same for any buyer or manufacturer.

Impedance Specification . . . The specification in the new standard regarding impedance is a distinct advance in the direction of greater operating flexibility. The new standard not only specifies the impedance on the rated connection, which in all cases is the mid tap, but also specifies how the impedance on the other connections may vary from the impedance on the rated connection. As a result fairly good parallel operation between transformers of different manufacture but of the same voltage rating will be possible without their being specially designed for parallel operation, provided the transformers comply with these standards.

The voltages and range of taps specified are consistent with Table 9 of the EEI-NEMA report "Preferred Voltage Ratings for AC Systems and Equipment."

Questionnaires . . . To resolve controversial items the committee resorted to questionnaires. These were sent to a large and diversified group of correspondent advisers to obtain their comments and suggestions regarding various proposals. Correspondent advisers are individuals who have been designated by their company, agency, or firm to reply to questionnaires and give the consensus of their organization with respect to the proposals. The committee has 158 advisers representing 110 power companies, 17 government and municipal agencies, 13 consulting and 18 industrial firms. Between 65% and 75% of the ad-

visers replied to each questionnaire, and in most cases there was a high degree of unanimity in the replies. In addition, questionnaires to transformer manufacturers furnished data on transformers purchased over a nearly four-year period from January 1946 through October 1949.

One study of this type which extended over two and one half years and required hundreds of hours of work was the study of several suggested revisions of the standard kva's listed in the General Standards. These proposals are listed in Table of this article. Proposal C was adopted as the standard three-phase rating for the range of ratings covered by the new standard. It is not satisfactory to all users but the great preponderance of opinion in advisers' replies indicated that the adoption of Proposal C as standard is fully justified.

Results of Third Kva Questionnaire

Type Adviser	Questionnaires Sent	Questionnaires Replies	Proposal C For	Proposal C Against	Proposal C Yes & No
Power Company	110	84	73	10	1
Govt. & Mun.	17	12	12	0	0
Industrial	18	12	12	0	0
Consulting	13	9	9	0	0
Total	**158**	**117**	**106**	**10**	**1**

Alternative Items . . . For some items such as oil preservation systems and attachment of cover to tank it was found impossible to narrow the standard to a single choice and still attain high acceptance. This is why both sealed tank and gas-oil-seal oil preservation systems are standard for transformers above 2,500 kva and why both bolted and welded main cover are alternate standards for all ratings of the new standard.

If, in time, one of the alternatives becomes widely preferred by the users, the other alternative should be removed from the standard. It is preferable from the standpoint of economic gains for standards to include as few alternate constructions as possible.

Details . . . Part I specifies standard kva's, voltages, taps, impedances, polarity, angular displacement, insulation classes, routine tests, mechanical features, details of accessories and their location on the transformer. This part specifies electrical characteristics and mechanical features that surveys have indicated are essential or are required by practically all purchasers of transformers of the ratings covered by the new standard.

Part II specifies other characteristics and features that are required for some applications. This part covers forced-air cooling, winding temperature indicators, terminal boards, series multiple connections, junction boxes for cable connections, and other items that are required only for certain applications or have not usually been a component of transformers of the type to which the new standard applies.

In deciding which item would be specified in this part of the standard, the subcommittee in each case weighed the difficulty of providing the feature against the estimated frequency with which it would be specified. Items such as special tests, hardwood skids, packing for sea shipment, etc, that require no modification of basic standard transformers are included in Part II even though the usage is expected to be infrequent. In comparison, making provision for connection to cables is a major modification. The decision to include this item in Part II was not made until surveys showed that there was an appreciable demand for it.

One of the most important items in Part II is the provision for obtaining high voltage ratings other than the standard ratings listed in Part I. The group working on this phase of the standard decided that they would take as a starting point the maximum and minimum voltages for the tolerable zone as listed in Table I of the EEI-NEMA report "Preferred Voltage Ratings for AC Systems and Equipment." A list was then made of the power systems that operated at non-standard voltages. The working group then determined what adjustments would be required to accommodate these systems within the new standard. The size of the various non-standard operating systems, and the degree of modification required to accommodate them, the effect on transformer core design, etc. were considered, and the decision then made as to what would be an acceptable range for high voltage ratings.

A Major Accomplishment . . . The subcommittee believes that a long step forward has been taken by formulating these standards. It further believes that they are in accordance with the desires of most purchasers and manufacturers of power transformers. The new standard is a workable standard, though not complete in all details. General usage of this standard should result in better transformers and economic gains to all concerned.

Membership of ASA C57 Subcommittee For Power & Distribution Transformers

H. M. Jalonack, Chairman, General Electric Co
E. V. DeBlieux, Deputy Chairman, General Electric Co
D. M. MacGregor, Secretary, EBASCO Services, Inc
H. G. Barnett, Westinghouse Electric Corp
M. L. Bright, Westinghouse Electric Corp
G. W. Clothier, Allis-Chalmers Mfg Co
W. F. Dunkle, Penn. Power & Light Co
J. A. Elzi, Commonwealth Associates, Inc
R. T. Henry, Niagara Mohawk Power Corp
W. R. Johnson, Pacific Gas & Electric Co
H. B. Keath, Wagner Electric Corp
R. O. Loomis, Georgia Power Co
C. M. Lovell, Maloney Electric Co
P. S. Pugh, American Gas & Electric Service Corp
W. R. Swoish, Pennsylvania Transformer Co
J. H. Vivian, Southern California Edison Co
L. A. Wollgast, Detroit Edison Co

Alternates:

P. E. Cook, Allis-Chalmers Mfg Corp
A. L. Horelick, Pennsylvania Transformer Co
M. F. Mitschrich, Maloney Electric Co
C. L. Sidway, Southern California Edison Co
T. F. Volkmer, General Electric Co

OFFICERS AND SPEAKERS at SEE conference included: Pres H. C. Leonard; E. W. Robinson, vice president, Alabama Power; J. M. Oliver, section chairman; and A. A. Johnson, Westinghouse Electric Corp

BETWEEN SESSIONS, Howard P. Seelye, Detroit Edison Co; Pres Harllee Branch, Jr, Georgia Power Co, and John Talley, executive director of Southeastern Electric Exchange, posed for EW's cameraman

Top Service at Reasonable Cost . . .

. . . is the theme of SEE's Engineering and Operation Section Conference. Use of higher voltage is urged

The greatest weapon for keeping the utility industry privately owned is first class service at a reasonable cost, according to H. C. Leonard, president of Southeastern Electric Exchange and vice-president of Gulf States Utilities Co. He addressed the SEE Engineering and Operation Section Conference in Atlanta, September 25-26.

Leonard said the goal of the electrical industry must be to develop the business in every feasible way as always to render first class service at reasonable cost. He urged the standardization of higher voltage lines and the use of package substations to save engineering talent for other jobs.

In describing "The Newer South," Harllee Branch, Jr., president of Georgia Power Co, said 300 multi-million dollar industries with a total value of $3 billion were established in the South during 1951. New industry is being established in the South, he said, at a rate about 45% above the national average. Gain in per capita income is running 50% higher than the national average. However, he said, per capita income of the South is still the lowest of any section of the nation —40% below the national average. The South is still the nation's least industrialized section.

Reduce Costs . . . E. W. Robinson, vice president and general manager of Alabama Power Co, said profits result just as certainly from reduced costs as from increased revenues. He said investor-owned utilities must keep their electric rates reasonable compared with those of public power agencies. But at the same time, he said, they must provide better service, pay taxes amounting to 20-25% of their gross revenue and pay commercial rates of return on their investment. He said that competition with public power agencies called for a high order of management and administration and a talent for economical and efficient operation.

The most pressing technical problem now facing the electric utility industry is adequate long range planning of system patterns for future expansion, according to A. A. Johnson, Westinghouse Electric Corp. He said expansion plans should be made with patterns that can be modified as the need arises to supply load growth in any area of a system. He urged the standardization of higher system voltages among neighboring companies so that power flow during emergencies would not be limited by transformers. Few companies, if any, he said, have ever regretted going to a voltage higher than that which they could economically justify at the moment.

On Standards . . . Too many people vote for the approval of a standard for someone else to use, said H. P. Seelye, Detroit Edison Co. Some engineers do not realize how much it really costs to divert an item from a production line in order to put on a special valve or bracket, he stated. There are 51 various standards projects (32 of which are active in 1952) listed for the Electrical Standards Committee of American Standards Association, he said.

S. G. Pugh, Southern Bell Telephone & Telegraph Co, said the poorest chemical brush control job that would be acceptable commercially leaves the right-of-way more accessible, more penetrable and more usable than a cutting job could ever do. He said Southern Bell has sprayed about 16,000 acres of brush to date this year with an average cost of $34.83 an acre. During this same period about 6,600 acres of brush were hand-cut at an average cost of $36.34 an acre. Hand-cutting required 22.4 manhours an acre compared with an average of 6.3 manhours an acre to spray brush.

Top Problem . . . Electric shock and burn is the outstanding safety problem

facing the industry in the opinion of W. F. Brown, Consolidated Edison Co, chairman of the Edison Electric Institute's Prevention Committee. Approximately 900 employees of the 1,300 killed by on-the-job accidents in the electric industry during the past 10 years were victims of electric shock or burns. In this ten-year period not one death has been reported from hand contacts where rubber gloves were used while the lineman was working near hot wires.

W. L. Rush, Louisiana Power & Light Co, offered the following recommendations for joints, taps and splices in connection with aluminum conductors: (1) Clean the conductor thoroughly; (2) use a good inhibitor—plentifully; (3) use only aluminum in making aluminum-to-aluminum connections—no part of the connection to be copper or steel; (4) use only compression connections; (5) cover connections with air-seal.

A 3-kvar secondary capacitor should be installed across the motor terminals of all package room air conditioners, A. J. Mary, Gulf States Utilities, said. The reactive kva should be as near the load as possible, he added.

In discussing the use of bundled conductors vs reconductoring, P. S. Colby, Ebasco Services, said labor cost and outage time would be comparable. The use of bundled conductors may result in lower net cost depending upon the salvage value of the existing conductor.

Corps Must Show Cause in Albeni Falls Case

Army Corps of Engineers has been ordered to show cause in federal court at Coeur D'Alene, Idaho, Oct. 8 why it should not be restrained from impounding water behind Albeni Falls Dam on the Pend Oreille River near the Idaho-Washington state line.

The City of Sandpoint filed the suit June 17, asking the restraining order and $1,000 a day for the damages alleged to have resulted to the city's sewage plant and beaches because of waters rising behind the Albeni Falls Dam.

Reservoir gates at the dam, still under construction, were closed June 11 to impound 1.4 million acre ft of water which can be released this winter to add to power production at downstream dams on the Columbia River.

MEETING REPORT

GOV JOHN S. FINE of Pennsylvania: "Wise and capable leadership is required . . ."

Progress Tied to Power Supply

Gov John S. Fine tells Pennsylvania Electric Association utilities must expand to strengthen communities they serve

Private power companies must expand so that they may strengthen the communities they serve, Gov John S. Fine recently told Pennsylvania Electric Association.

Speaking at the association's 45th annual meeting in Pittsburgh, Fine commented, "Wise and capable leadership is required now as never before, because the progress of our country depends on the sufficiency of its electric supply."

Private enterprise, Fine said, has provided nearly 99% of the electrical supply for Pennsylvania.

Chairman Harold A. Scragg of the state Public Utility Commission said privately owned utilities must fight to sell the public on the importance of their services.

Competitor? . . . America's future, he said, depends upon the men who manage the privately owned power companies. Their greatest danger, he said, lies in groups that are trying to drive the government out of its regulatory role and into the role of competitor with tax-paying business. Government ownership of all utilities would be fatal to the public welfare, he asserted.

News analyst Henry J. Taylor said the basic difference between Russian and American thinking is that Russia distrusts free enterprise, but feels well satisfied with its victory in war and its new power. Taylor doubts that the Soviet plans war, but rather seeks to promote demoralization and confusion in the United States. The Russians, he said, hope the arms program will bankrupt us, and for this they are willing to wait and work many years.

The country today is in a mess, Miss Vivian Kellems, president of Kellems Products Co, told PEA. This could have been avoided, she said, if business men generally had come to the support of the electric utilities 20 years ago when the first assaults on private property began.

"Let's stop being half apologetic," Miss Kellems said. "The electrical industry today has nothing to be apologetic about. Electricity is the cheapest thing that money can buy. We should be proud of this fact. We need make no apology for earning a profit. Private property is the cornerstone of civilized government."

No Limit . . . "There is no foreseeable limit to the market for electricity,"

said President Bayard L. England, Edison Electric Institute. Denying the contention of government agencies that the job is too big for private capital alone, he said the industry and the manufacturers were never better prepared to supply these potential additions.

NRECA Memorial?

Association considers new headquarters building named for Sen George Norris

A memorial building dedicated to the late Sen George W. Norris to serve as Washington headquarters for the National Rural Electric Cooperative Association is in the talking stage. The idea is spreading as NRECA officials barnstorm across the country on the second half of ten regional meetings.

Delegates in four NRECA regions already have passed resolutions backing the proposal. In addition to commemorating the work of Sen Norris, sometimes called "the father of rural electrification," the building would provide roomier modern quarters for NRECA's 31-person administrative staff. The association now occupies a three-story, half-century-old building purchased in 1948. It is the third home for the association, the first owned outright.

How much the project would cost and how it would be financed has not been determined, though a Region 7 resolution recommended that it be underwritten "by contributions from members of the rural electric cooperatives, power districts, and others." One sum NRECA can count on, a staff member noted, is about $200,000 on the sale of its present site located in Washington.

To Aid Japanese Survey

Two American engineers are in Tokyo to assist the Japanese power industry set up an electric power survey procedure similar to the one carried out in the United States by Edison Electric Institute. They are F. Douglas Campbell, Detroit Edison Co and Leroy L. Hinckley, Pacific Gas & Electric Co. The visit is being made at the invitation of the Japanese government.

3-Way Intertie Arranged

Union Electric of Missouri agrees to combined operation of its plants with those of two Illinois utilities

A recently concluded interchange agreement among Union Electric Co of Missouri, Illinois Power Co, and Central Illinois Public Service Co provides for combined operation of all the generating plants of the three utilities. The agreement becomes effective when it receives approval of Federal Power Commission and Illinois Commerce Commission.

Under terms of the agreement the companies will make available to each other all of their reserve capacity. The pact also provides for the sale of energy by one company to the others whenever an overall saving in production can be effected.

Third Step . . . This latest move by the three companies is the third step in a long-range program for integration of power supply for St. Louis and adjacent areas of Missouri and Illinois.

The first step, taken in 1950, involves an interconnection between Union Electric and Kansas City Power & Light Co. The intertie was completed this year and began functioning in July.

The second was the agreement to interchange power with Electric Energy Inc's plant under construction at Joppa, Ill., which will supply an atomic energy plant at Paducah, Ky. A $10-million transmission line now is nearing completion to implement this interchange.

Integrated Operation . . . The latest agreement goes beyond the first two, which primarily are concerned with economical interchange of power and the use of surpluses at either end of the line or for emergencies. The new accord provides for integrated operation of all the generating facilities of the three utilities, for agreement among them about the building of new generating units, and power plant maintenance schedules for the group.

Union Electric believes that "ready reserve" can be reduced by about half for each company as a result of the agreement. It is also felt that new installations of generating equipment can be planned on a more economical basis as to timing, location, and unit size.

POWER BRIEFS

● Cooling tower make-up water for Oklahoma Gas & Electric Co's 60,000-kva South Station near Sulphur will be supplied from an 868 ft artesian well with a 2,500 gal per min flow. The station is scheduled to go into service in December 1952.

● Pennsylvania Power & Light Co is setting up "Neighborhood Bill Payment Centers" to make paying service bills more convenient for customers and increase store traffic of appliance dealers. Instead of paying their bills in banks, drug stores, or other places, customers will go to the neighborhood appliance store. The dealer will benefit by getting more people into his store and the company by having an unofficial representative who is acquainted with electrical matters.

● Two historic landmarks of the Pacific Northwest will be washed out next year when waters from the nearly completed McNary Dam begin to back up in April 1953. They are the site of old Fort Walla Walla, pioneer stronghold on the Columbia River, and the village of Wallula, second oldest settlement in the former Oregon territory. The man-made flood will bury the area under 50 ft of water.

● There are 4,000 steps leading from a new hydroelectric plant at Aura, Norway, to the top of the water dam. They are believed to be the longest single stairway in the world.

● A little black bear thought he had picked a safe spot to hibernate when he ambled into the main tunnel of the Eklutna hydroelectric project in Alaska. Underground workers were disturbed when he shuffled across a lighted area. The bear steaks were good, though, they tell us.

Minnkota Power Cooperative stages 26-block parade . . .

. . . at dedication of new power plant. Of the 75 units, 40 were entered by appliance dealers and distributors displaying electrical equipment. Afterwards, the floats were parked where maximum foot traffic occurred, and salesmen presented their stories

$200,000 Promotion by G&T Co-op

Minnkota Power Cooperative contributes half of funds to spread use of power among 38,000 consumers. Prizes totalling $10,000 induce farmers to tell appliance needs in survey

To encourage farmers to make greater use of electricity, Minnkota Power Cooperative, Grand Forks, N. D., has been conducting a $100,000 sales campaign among the 38,000 consumers served by its ten member distribution cooperatives. Its effort has been made doubly effective by another $100,000 contributed by the ten co-ops obtaining power from Minnkota's generation and transmission facilities. The combined expenditure is an average of $5.26 per consumer.

Minnkota officials believe the drive already has paid rich dividends. Although the program had been in effect only eight months on Dec. 31, 1951, load for the year exceeded the budget by 6 million kwhr. Kilowatt hours delivered to distribution co-ops increased by 22.5% over 1950, and power usage per customer per month shot up sharply.

Program Outlined . . . First step in the drive was to present the plan to representatives of manufacturers of electrical equipment. They were told that during the past decade Minnkota and its member co-ops had been in the construction stages and that now they would undertake the job of putting electricity to work for the convenience and profit of the farmers in the area. They were told that the $200,000 promotion would feature:

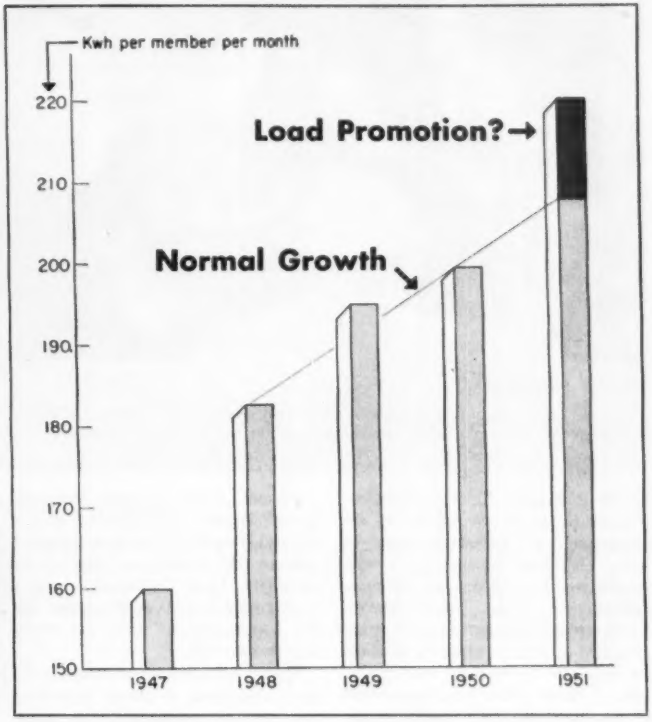
1. **Direct mail advertising**
2. **Promotional publications**
3. **Radio advertising**

Prize winning selections . . .

. . . at rural electric show were made by M. S. Swanson, Minnkota vice president from among 31,610 cards. Utilization Manager L. W. Nicholson watches

Highlight address . . .

. . . at dedication of power plant (see left) was given by Sen. Robert Taft



Graphic growth . . .

. . . of monthly kwhr consumption per customer is demonstrated in the fact that normal expectations were exceeded by 13 kwhr during eight months of promotion campaign in 1951

and Its Members Wins Farmers

4. Newspaper advertising

5. Special promotion involving membership participation

A similar meeting was held with county agents, newspaper publishers, radio managers, electrical distributors, superintendents of schools, and home economists. These groups all cooperated to make the program more effective.

Manufacturers and distributors were offered the free use of Minnkota's auditorium for dealer meetings. Assistance in planning and arranging meetings was also offered.

A master schedule of Minnkota's radio and newspaper advertising was made available so that manufacturers and dealers could coordinate their individual program with it.

Minnkota also assisted dealers and manufacturers in displaying their equipment, particularly before large groups. Special promotions were arranged in connection with such displays.

Appliance Survey . . . Key to the program was a consumers' appliance survey, backed by $10,000 in prizes as inducement to members to return a completed questionnaire. The survey was designed to show what appliances were owned and what were the future purchasing plans of each consumer. Results of the survey were made available to dealers through local co-op offices.

Each of the distribution cooperatives was allocated ten prizes, such as water heater, clothes dryer, radio, and smaller appliances. Survey cards for each cooperative were placed in a container and a drawing for prizes was made at the cooperative's annual meeting.

Survey cards were filled in and returned by 55% of the 38,000 customers. The "intend to buy" list was reproduced and given to dealers by areas. Equipped with names, addresses, and a list of equipment co-op members intended to buy, many dealers put on extra fieldmen. They worked the list by farm to farm selling. Others used it in direct mail campaigns.

Sample shopping . . .

. . . at the cooking school held in conjunction with Farm Couple Meetings, these ladies pick and choose from among the delicacies prepared. Even the men enjoyed this shopping

Credit Arranged . . . Another important factor in the success of the campaign was the arrangement of terms and loans in accordance with Regulation W. Money to purchase refrigerators, ranges, water heaters, wiring, plumbing, motors, and other electrical equipment could be obtained by members from their local co-op office. These plans were announced to manufacturers and dealers at the beginning of the program.

To assist in the sale of water heaters, all Minnkota member co-ops set up a special water heater rate.

Improved service, through 69-kv transmission loops to nearly all substations and the installation of numerous voltage regulators, was announced as one of the sales aids to dealers.

Advertising and Promotion . . . Direct mail advertising took the form of post cards, letters, circulars, and special pamphlets to all customers, all bringing the story of productivity, profit, and pleasure. Mailing pieces were sent out an average of three times each month.

Newspaper advertising was carried in more than 70 weekly publications and in daily papers throughout the area.

Special promotions involving member participation included: Annual meetings of the co-ops; cooking schools; spelling contests for rural school children; scrap book contests; county fairs; state and regional fairs; and special promotions designed for the farmer and his family.

Annual co-op meetings featured special displays of equipment, plus a full and complete program designed to educate the member on the use of electricity. Local dealers were invited to take part in such meetings and use this opportunity to show the wares they had for sale.

Special REA booths at county fairs were employed to keep electricity and electrical products in the members' minds. Novel displays were used to show the versatility of electricity and its cost in terms of hours of manual labor.

Cooking schools featured trained personnel supplied by the manufacturers. An all-electric indoor show featured all types of electrical equipment with the manufacturers arranging the displays and presentation of equipment.

Because of the late harvest, this was an indoor show which ran from Feb. 4 to April 6. There were 31,610 people registered at the 31 showings, and hundreds were turned away because of limited seating capacity. At each meeting 30 prizes were given away—ten furnished by Minnkota Cooperative, ten by the distribution cooperative, and ten by local merchants.

There were items such as waffle irons, electric coffee makers, fans, space heaters, headbolt engine heaters, irons, and others, at an average value of about $8. This made a total of $7,200 in prizes. Then, in cooperation with the appliance distributors, five major prizes were awarded at the end of the tour. The registration cards were accumulated and a drawing held in the Minnkota plant. These major prizes were an automatic clothes dryer, refrigerator, radio-phonograph console, home freezer, and a range.

The news release announcing the winners was carried on the front page of 66 of the 70 weekly newspapers in the area and over all local radio stations.

Special promotions such as cooking, freezing, welding, sewing, and motor schools were arranged. Minnkota also cooperated in such promotions when put on by distributors.

Plant Dedication . . . Full advantage was taken of the dedication of Minnkota's new Franklin P. Wood steam plant. Speakers including Senator Robert A. Taft and REA Administrator Claude Wickard drew thousands of farmers to Grand Forks. Forty dealers and distributors participated in a colorful parade with floats displaying all kinds of appliances and electrical equipment. After the parade the floats were parked where the maximum foot traffic occurred, and salesmen were on hand to give their pitch. Dedication specials were featured that day to draw store traffic.

"Farm couple" meetings were another highly successful promotion. A series of five to ten meetings was scheduled with 75 couples invited into the plant each day. They came from various parts of the system. To insure their appearance, invitations were sent stressing the fact that they were among the 75 couples chosen from the vast area of the system to see the generating facilities. They were told that Minnkota wanted to entertain them for the day.

They were given a plant tour, institutional information, and a lunch. The ladies returned to the auditorium for a cooking and freezer school while the men witnessed demonstrations and listened to discussions on barn ventilation, welding, brooding and other methods of using their electric service to increase farm production.

The enthusiasm with which these meetings have been received has prompted plans for similar meetings throughout the year. Couples will be told about rates, service improvements, simple power economics, and gas versus electricity. They will be given brochures covering these subjects so that they may discuss them at their local neighborhood homemaker meetings.

A Big Welcome to New Jersey

To welcome motorists entering New Jersey over the Delaware Memorial Bridge, just south of Wilmington, the Atlantic City Electric Co has erected a gigantic sign on the roof of its Deepwater Plant on the eastern shore of the Delaware River.

The 14.5-ton sign, constructed of galvanized steel, is 42.5 ft high and 127.5 ft long. The clock is 20 by 20 ft. Made of neon tubing in three colors, the sign will be visible to motorists at a point half way across the bridge. The dark column at left of the clock is a smokestack.

Vepco Employees Take Course in Electricity

"Since I work for the power company, a lot of my acquaintances think that I know something about electricity. Now I can answer a lot of their questions that I've had to sidestep in the past."

This comment of an accountant of the Virginia Electric & Power Co. who had taken the company's course on electricity proves that the course is accomplishing just what was intended.

Since last November nearly 150 employees who do not have technical educations have taken it. These included messengers, accountants, secretaries, meter readers, and truck drivers.

The text for the class is "Simplified Electricity for Utility Workers." P. R. Rutledge, the author, is an electric utility industrial engineer. He developed the course in cooperation with several utilities with an eye toward making a down-to-earth explanation of the generation, transmission, distribution, and metering of electrical energy.

Vepco pays for the text, the instructor, and the classroom. Employees take the course at night on their own time. Public school teachers are hired as instructors.

"Graduates" are presented with a certificate of achievement by the company, which will continue the course as long as there is a demand for it.

Keeps Sports Program

For the second year, the Westchester Division of Consolidated Edison Co. will sponsor the "Scholastic Sports Page." This 15-minute radio program (EW, June 30, p 61) honors outstanding scholastic athletes in the territory served by the division. Participants in all sports are eligible. The program will be carried by Stations WFAS and WFAS-FM at 5 and 8:30 PM, Thursdays.

Contest Judging Set

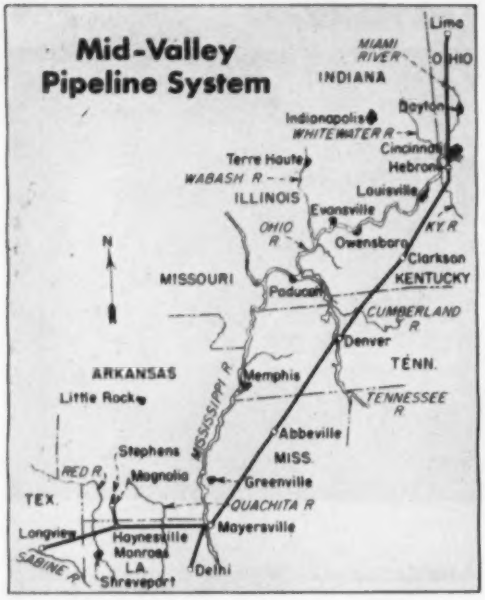
Statewide judging of the 279 entries in the Champion Home Town Contest conducted annually by the Georgia Power Co will take place Nov. 10-14. A total of $8,910 will be distributed in prizes. To assure the fairness of the competition, the towns are divided into divisions according to population.

AD COPY THEMES

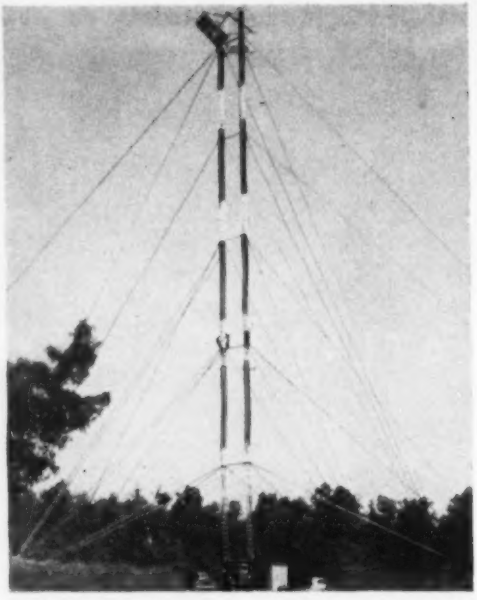
Connecticut Light & Power Co—"We're used to being examined" is head on an ad playing up the fact that the company's business is closely regulated by the state Public Utilities Commission. A microscope with a man in the slide holder takes the left third of the ad.

Kansas City Power & Light Co—Single-page ad for Labor Day insertion in "Kansas City Star" and two local labor papers uses the theme of "Free Enterprise at Work." This is the story of the electric companies' expansion program. Right half of the ad is a huge sketch of a power plant under construction. Small underlines tell of KCP&L's own construction program.

Northern States Power Co—"Cheap electricity does my hard work" says an advertisement telling of the use a dairy farmer makes of electricity. An insert is a testimonial from a housewife on the value of an electric ironer. The advertisement was run during September.



MID-VALLEY PIPELINE SYSTEM, 1000 miles long, is served along its entire length by microwave communications links operating at 6,800 Mc. Maximum of 12 channels communicate on single carrier



H-FRAME TOWERS for repeater stations. Towers are 80 to 250 ft high, 9 to 40 miles apart. Base-mounted paraboloids and tower-mounted "flyswatter" reflectors beam the carrier to the next link

Microwaves Serve Pipeline

39 repeater stations give almost trouble-free operation along Mid-Valley Pipeline Co's 1,000-mile crude-oil pipeline. Two years' operating experience piles up future wisdom

C. B. LESTER and C. A. COMPTON
Mid-Valley Pipeline Co, Longview, Texas

Mid-Valley was forced into the microwave picture because it found that an integrated VHF point-to-point communications system could not be obtained without building wire lines. We were one of the pioneers, and this paper is to give information accumulated in two years of operation, so those contemplating similar systems may avoid the same trouble traps.

Given identical production prices, the cost of our system could be cut $100-200,000 because of what has been learned. Looking back over the past two years of microwave development, it is difficult not to be optimistic about the next ten.

Prophecy . . . We should see 99.9% systems; somebody will build a system with a storage battery standby and a 100% system will be running. IF strips and multiplex troubles will disappear. Maybe a pulse-numbers or a pulse-frequency system with theoretically perfect cleanup will be built.

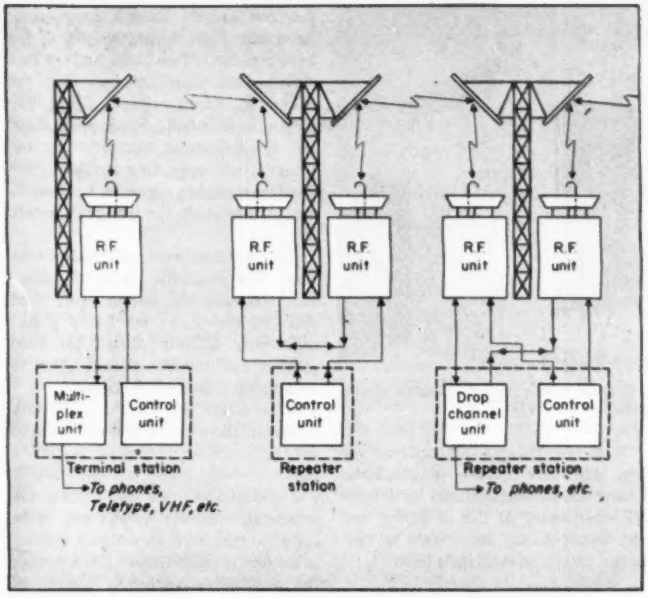
Maintenance costs will come down until present costs, reasonable enough on a circuit-mile basis, will seem extravagant. Maintenance engineers' territories will be limited only by policy on how far a man should travel from home on a routine basis. The two-man 1,000-mi system is coming.

Background . . . In 1948, engineers of Sun Oil Co and Standard of Ohio began studies to determine the type of communications system best suited for a 1,000-mi crude-oil pipeline—the Mid-Valley Pipeline then coming into existence. Microwaves were not even considered; microwave literature offered a panacea to all communications ills, but in reality only short experimental systems had been built.

The first estimates were based on 70-Mc radio with a companion VHF mobile system, but the rapid expansion of TV and the FCC Rules, Parts 11 and 17, killed all hope of 70-Mc.

An estimate showed almost no economic justification for owning a long wire line. A survey for an extensive leased telephone line system, with VHF tied in at all points, was commenced. Since the survey required at least six months and some manufacturers felt ready to build a big microwave system, specifications were issued and bids were taken.

One bid was slightly over $4,000 per mi; another suggested 200 mi of microwaves pieced out with 800 mi of leased lines; a third would sell the equipment if Mid-Valley would install it and be responsible for its performance. All bids were turned down; the costs were high, the value to be received was not known and certainly not guaranteed, and the results highly questionable.



BLOCK DIAGRAM of typical circuit link, showing multiplexing of signals, rf antenna disk, and flyswatter reflector up on tower. Repeater station may tie into communications links or not depending upon the station location in the pipeline system

Communications Needs

But the survey dragged on, making it apparent the leased line-VHF system was not going to materialize. The microwave specifications were rewritten, bid on, and a supplier selected.

The Completed System . . . Mid-Valley has 13 pump stations, one delivery terminal and a general office. There are 39 microwave stations covering over 1,000 mi. The system has 10 channels out of 12 permanently activated, one temporarily activated. It operates on 6,800 Mc using a T-R (transmit-receiver) type unit with 65 milliwatt klystrons as transmitting and local oscillators. Microwave equipment is furnished in full duplicate at each location. Standby RF equipment is switched in automatically when there is an electronic failure, and standby ac power is switched in when commercial power fails.

The multiplex system is double FM frequency division with triple FM used on the teleprinter circuit. Multiplexing means, in general, the mixing of several voice or signal channels to simultaneously modulate a rf carrier. Using audio signals to frequency modulate a subcarrier transmitter, which in turn is used to frequency modulate an rf carrier, is termed "double FM multiplexing." Dc "on-off" functions or teletype "space" and "mark" signals are often transmitted by "triple FM multiplexing."

Twin towers are used at each location, except for two stations where vertically mounted dishes are located; all other stations use flyswatter reflectors on the tower with horizontally mounted base parabaloids. All microwave stations have their own standby equipment except those at diesel pump stations where the microwave equipment is connected to the main station bus and is supplied by the main station standby when commercial power is off.

The stations are supplied with a split 220-v 60 cps single phase service from a three kva transformer. Electric energy costs average $25 per month. At the time of construction, the cost for 12 channels was approximately $900 per mile. Present costs would alter this figure considerably.

Propagation . . . Although not true from an engineering standpoint, it is true from an operating standpoint that (1) there are no fades, and (2) rain and snow do not attenuate the signals. Our system generally has a 30-40 db fading margin in the radio frequency spans. With a double FM system we have a true fading margin of 24-34 db for full improvement. Unless the system experiences a fade within 6 db of the zero S/N point, the listener never hears the fade.

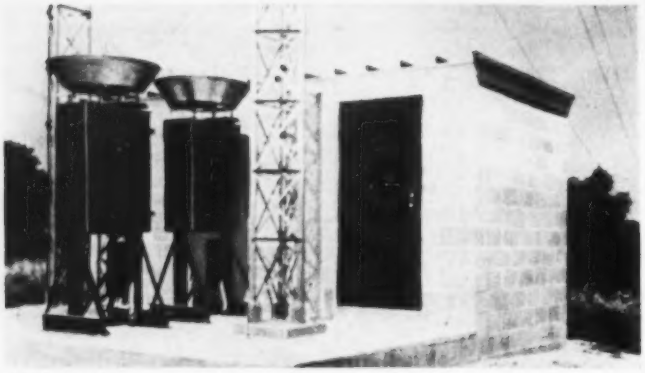
A substandard atmosphere (a temperature inversion in higher strata of air) will produce substandard propagation, but this occurs so rarely it may be discounted. Two-path fades take a signal into the noise very quickly and bring the signal out of the noise just as fast. Because of the rapid fluctuation in the signal phase at 6,800 Mc, the interruption to communications is very slight.

Towers . . . Twin rail-steel towers 80-250 ft high support reflectors from 4x6 to 8x12 ft in size. They are guyed into concrete anchors. To date we have had no cases of towers going out of alignment. Towers have been through several bad ice and wind storms, with ice up to 2 in. and winds to 70 mph. In the recent Arkansas tornado the top guys of a tower were stretched but the signal was not lost.

Our system uses base-mounted parabaloids. Some of our bases were set on green tamped earth fill; in all probability we will be realigning parabaloids for some time to come. If base-mounted parabaloids are used, tie them to the tower or pour the slab on a sand-and-gravel fill inside a curtain wall through the frost line.

Reflectors . . . The inverse square law for illuminating loss appears to work out differently for microwaves. We get better S/N ratio using a pair of 200-ft towers and 8x12 reflectors than we do with a pair of 150-ft towers with 6x8 reflectors. Yet the illuminating ratios are about the same. We recommend big reflectors up on top and believe you can then discount illumination losses.

Paths . . . Our average path is about 28 mi, longest path 40, shortest path about 9. The clearance varies greatly. The first paths were laid out with approximately 50-ft minimum clearance; later the criteria was dropped to 15 ft plus the distance in miles to the clearance point. Perhaps even this



RF HOUSINGS and repeater station at Hebron. Compact station, as well as entire system, was purchased by Mid Valley as a package installation

is too much clearance, but maybe the insurance is worth the cost.

Our surveys were based on USGS, USCGS and various other government agency maps. Where contour maps were not available we used planometrics from the Army Map Service or polyconic projection maps.

Continuity of Service . . . We have had no electronic outages. Our accumulative continuity is something over 95%. Over 95% of the outage time can be traced to causes not even remotely connected with microwave equipment, such as:

1. Sticking relays and defective timbers in the ac transfer panel.
2. Water in the gasoline tank of the standby set.
3. Broken oil drain leads on the standby set.
4. Burning out of constant voltage transformers.
5. Lightening hitting the incoming power line.
6. Sensing or transfer relays sticking in mid-position.

All outages were caused by failure of the standby ac power mg set, failure of the transfer panel to transfer power to or from commercial power, or failure of the entire ac system. We recommend hermetically sealed relays in all positions, an LPG ("bottled gas" fuel) engine instead of a gasoline engine on the standby set, meter service protectors on entrances right near the entrance caps. Insist on good sensing relays, since the system depends on these relays to switch over to standby RF equipment. Stay off long rural lines; pay more and get a better circuit if possible. Get constant voltage transformers that are too big.

With Mid-Valley's full duplicate system, whenever there is an electronic failure the station switches to standby RF equipment. If the ac power system would do the same, we'd be running a 99.0% system right now.

Tubes: A Myth Dispelled . . . A klystron running below rating is the most reliable tube in the entire microwave system. Our Communications District II has been running continuously since May 1950. The equipment has 4 klystrons per station or 44 for the sector. From November 1951 through March 1952, the District Engineer replaced one defective klystron. Based on tubes in their sockets since the equipment was installed, for the five months cited the average tube cost was $4.53 per month per station. Averaging out at $5 per month per station, we forecast a tube cost of less than $60 per station per year.

In Communications District II it appears tower light maintenance, including the cost of replacing the lamps and reporting outages to the CAA, is going to run about $6.75 per tower per month. Perhaps this means installing lower light-sensing devices and full duplicate lamps to reduce replacement expense.

Don't build roads to tower sites; build near existing roads and pay for a higher tower. Roads and their maintenance cost a great deal. With our present knowledge we would never have spotted some repeaters in such hard-to-reach places, just to obtain less costly land or higher base elevations. Tower steel costs less.

Voice-frequency and Multiplex Equipment . . . Ideally, a repeater should put out exactly enough to produce unity output in the transmitter of the next repeater. Two stage limiters and AGC video amplifiers help but the system is never perfect. Some distortion, crosstalk, intermodulation, etc, is experienced but these are engineer's, not operator's troubles. We possibly wouldn't experience crosstalk, etc, if it weren't for our push-to-talk circuits.

Specifications were -40 db down on noise and crosstalk. With all channels weighted the lowest figure read was -37 db. Later we found a bad adjustment at one station (in level setting) and the 37 db has gone to something considerably better.

Now 40-45 db down in crosstalk is hardly audible and generally would not be heard in the noise around a pump station. However with double FM and push-to-talk party lines, the subcarrier receiver is running wide open, so that without a signal coming in its gain is tremendous. Even though the crosstalk substantially disappears when a signal hits, the crosstalk is heard any time the circuit is idle. The moral of this: Use duplex party lines.

IF Strips . . . IF troubles have boiled down to noise unbalance sufficient to control the AFC when no signal is coming in. The discriminator output with no signal can sometimes push the center frequency so far off that if an adjacent station loses power the receiver with the noise-unbalanced strip cannot catch the signal. The only solution seems to be more maintenance or better strips.

Outside of tubes, relays, tower lights and gasoline, our parts bill is insignificant; replacement parts can be discounted in making up operating costs. However, build in all the test equipment possible and practical. Figure at least $10,000 per man for test equipment alone.

Conclusion . . . We feel that next year will see us running close to 99% in continuity, even allowing for power outages. We have no fades, no electronic failures and few unkilled bugs at this time. The troubles in the ac portion of the stations are being steadily surmounted, and we have every faith they will be solved eventually. Our multiplexing system is already outmoded but this is merely early obsolescence incurred as part of the penalty for pioneering in an unknown field.

A New Approach To Cold Load Restoration

Study offers method of calculating relay performance with any given time-current characteristics, when subjected to inrush current of any magnitude

OLIVER RAMSAUR, Development Engineer, Pennsylvania Power & Light Co, Allentown, Pa.

The problem of re-energizing distribution feeders after outages lasting more than several minutes is becoming more acute with increases in both feeder loading and density of automatically controlled residential loads like refrigerators, deep freezers, oil burners, and water heaters. On the Pennsylvania Power & Light Co system, the problem has long been recognized on certain heavily loaded feeders, and procedures have been established for sectionalizing them while repairs are being made. But a few unexpected cases led to a study to find out more about the safe limits of loading with respect to the settings of the protective relays on the feeder breakers. Specifically, the study was aimed at finding out:

1. How much load we can be sure a given relay will pick up.

2. How much is gained by increasing time settings of existing relays.

3. How much advantage the "very inverse" type of relay has over the "inverse" type.

The study resulted in a straightforward and flexible method of calculating the performance of a relay with any given time-current characteristic when subjected to an inrush current of any given characteristic. Calculations based on a typical but pessimistic curve of inrush current showed that, for a given tap setting, the critical load for induction overcurrent relays is less than we had assumed, that little is gained by increasing time settings, and that the very inverse type of relay has little advantage over the inverse type for picking up load assuming the same clearing time for minimum fault current. It should be noted, however, that the very inverse type does have the advantages of better co-ordination with fuses and faster clearing of closeup faults.

The purpose here is to pass along this method and these conclusions and to emphasize the need for active study of other ways of overcoming this growing evil.

Line Protection Comes First . . . The purpose of protective relays is not to pick up load but to clear faults. For this reason the basis of all comparisons should be a fixed and reasonable relay time for minimum fault current. As the starting point for the calculations to follow, it was assumed that relay tap settings should be not greater than half the calculated minimum fault current and that the relay time should be not greater than 1 second. These premises led directly to a reference setting of 1 second at 2 times pickup current. This is only a common point for calculations, however, and it will be seen that the final results do cover a wide range of relay settings.

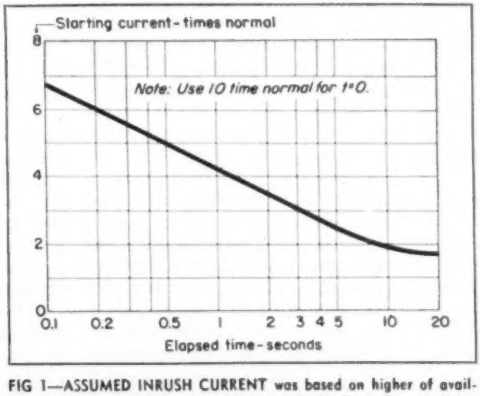


FIG 1—ASSUMED INRUSH CURRENT was based on higher of available inrush curves, since study aims at safe loading. For simplicity, curve was made straight through indicated range

Assumed Inrush Current . . . Since the study was aimed at safe loadings, the assumed inrush current was based on the higher of the available inrush curves, the average of which is closely approximated by the curve of Fig 1. For simplicity, this curve was made straight through the indicated range; and it was extended to 10 times normal at zero time because this was believed to be about the practical limit. Minor departures from these characteristics do not materially affect the results, however. And it is mentioned again that curves of any shape can be used with the method of calculation outlined. It is emphasized also that the final results of this article are based on this one particular inrush curve, whereas the actual inrush current will be different not only for every feeder but for every outage of the same feeder.

New Type of Relay Curve . . . Because relays continue to operate on inrush current right down to the pickup value, it is necessary to know what the relays do in this region. But the characteristic curves given by the manufacturers usually stop at 1.5 times pickup. Since the actuating torque of a relay depends on the amount of current above the pickup value, it seemed logical to try plotting the time-current curves in terms of one less than multiples of pickup. This was tried; and the resulting characteristic curves for the reference setting of 1 second at 2 times pickup for several familiar types of relay are given in Fig 2, in which both coordinates are logarithmic and the abscissa is "times pickup minus one" (XPU – 1). For easy reference, the corresponding scale of "times pickup" (XPU) is also given. This type of

Based on Conference Paper presented at AIEE Summer General Meeting on June 23, 1952

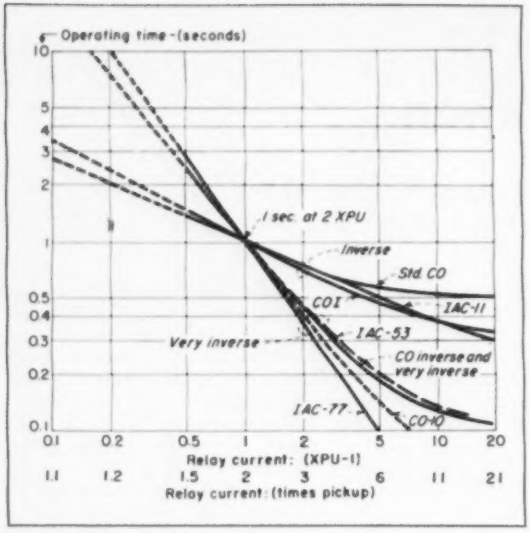


FIG 2—CHARACTERISTIC CURVES for reference setting of 1 sec at 2 times pickup for several familiar types of relays. Both coordinates are logarithmic, abscissa is "times pickup minus one"

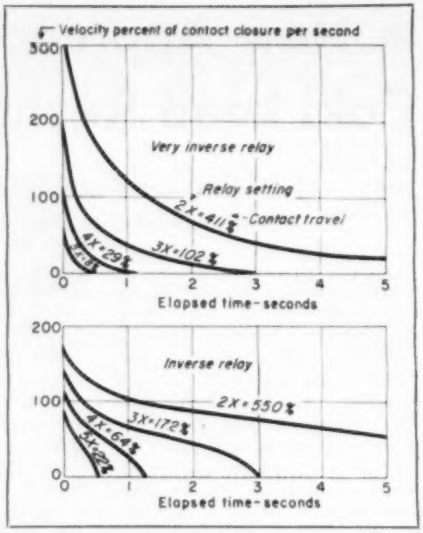


FIG 3—VELOCITY-TIME CURVES at 1 sec at 2 times pickup current, for several ratios of relay tap setting to normal load current. Each area represents theoretical percent closure

curve, which is believed to be unique, has several distinct advantages:

1. In the lower range of currents, the curve is essentially a straight line for most relay types and may be extrapolated into the region below 1.5 times pickup without much error in final results.

2. The point where the relay starts saturating is clearly indicated by the bend in the curve.

3. The nature of the relay characteristic is clearly indicated by the slope of the straight portion of curve.

4. The characteristic curves shown in Fig 2 fall into two distinct groups, the relays in each of which have almost the same slopes below saturation. These groups have been labelled "inverse" and "very inverse" for identification. It will be evident later that all the relays in each group will behave substantially alike on load inrush currents within a practical range.

Calculating Relay Performance . . . The procedure for finding the relay setting for 100% contact closure on inrush current is a simple application of the old principle of finding enough points to plot a travel-versus-pickup curve (Fig 4). These points are found from the areas under velocity-time curves for several ratios of relay tap setting to normal load current (Fig 3). The steps indicated in the table and described below provide a numerical example showing just how the curves of Fig 3 are derived. The additional steps culminating in the final answer are also described. Using the IAC-11 and CO very inverse curves of Fig 2 as being typical of inverse and very inverse relays, the steps are:

1. In the first and second columns of the table tabulate corresponding values of "elapsed time" and "inrush current" from the inrush curve of Fig 1, taking care to include points where the inrush current is 5, 4, 3, and 2 times normal peak load current. As an example, at 0.2 second the current is 6.00 times normal.

2. In the third column, which is for a relay pickup setting of 5 times normal load, the values of "Inrush/5" are the values in the second column divided by 5 and are thus the multiples of relay pickup current. Continuing with the example in Step 1, 6.00 divided by 5 is 1.20.

3. For the "velocities" in the fourth column, go to Fig 2, find the inverse relay time for the inrush current in the third column, and divide into 100% to obtain contact velocity. For 1.20 times pickup, Fig 2 shows the inverse relay time to be 2.0 seconds, which divided into 100 gives a relay velocity of 50% of contact closure per second. For the fifth column, repeat for the very inverse relay, getting a time of 7.0 seconds and a velocity of 14% per second for a current of 1.20 times pickup.

4. Repeat Steps 2 and 3 for relay pickup settings of 4, 3 and 2 times normal load.

5. Using the velocities tabulated, plot the curves of contact velocities shown in Fig 3 against uniform scales. (The abscissas in Fig 3 were stopped at 5 seconds to avoid crowding for this illustration only.)

6. Find the area under each curve using any of the several common methods. The areas are indicated in Fig 3. Each area represents the theoretical percent of contact closure for that particular ratio of relay setting to normal peak load, assuming that contact velocity for a given current is uniform for all contact positions (true enough for this purpose) and recognizing that closure beyond 100% is mathematical license.

7. Using the areas from Fig 3, plot the curves of Fig 4 against the semilog scales indicated. These scales give nearly straight lines over the necessary range of pickup ratios and make interpolation easy.

8. To plot Fig 5, which is the end product of this study, first find where the curves of Fig 4 cross the 100% closure line. These values are 3.55 times normal load for the inverse relay and 3.03 times for the very in-

verse relay. Dividing these values into 100% gives critical loads of 28% of the inverse relay pickup setting and 33% of the very inverse relay setting. These values determine the two points in Fig 5 for a relay time setting of 1 second at 2 times pickup. Next, to get points for 2 seconds at 2 times pickup (assuming that doubling the contact opening doubles the time), find the values of 2.88 and 2.50 where the curves cross the line of 200% closure. Divide these into 100 to get critical loads of 34% and 40% of relay tap setting. Repeat this process for 50%, 300% and 400% contact closure to get values of critical load for 0.5, 3 and 4 seconds. Plot Fig. 5.

The two curves of Fig 5 give the critical values of feeder loading for the two relay types for various time settings at 2 times pickup current, based on the inrush curve of Fig 1. Corresponding time settings or time lever settings for other multiples of pickup current can be obtained by referring back to manufacturer's curves.

Calculations Checked . . . The calculated curves of Fig 5 have been checked both by experience and by test. When data on a large number of actual cases of trouble were spotted on Fig 5, the borderline cases fringed the curves, indicating that they are valid for the worst conditions.

Very recently, the inrush curve of Fig 1 has been simulated in the laboratory. Actual performance of relays having the assumed characteristics agrees with the calculated curves.

What Figure 5 Shows . . . The three things we aimed to find out are given by Fig 5 as follows:

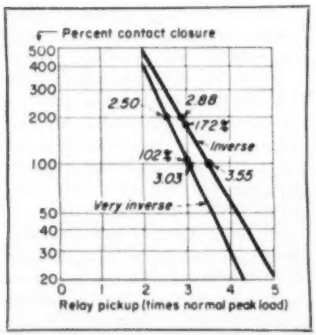


FIG 4—TRAVEL VERSUS PICKUP curves show relation between ratio of relay setting to normal load and percent contact closure

CONTACT VELOCITIES (Percent Of Closure Per Second)

Elapsed Time (Seconds)	Inrush Current (Times Normal)	Relay Pickup 5X Normal Load Velocity			Relay Pickup 4X Normal Load Velocity			Relay Pickup 3X Normal Load Velocity			Relay Pickup 2X Normal Load Velocity		
		Inrush 5	Inverse	Very Inverse	Inrush 4	Inverse	Very Inverse	Inrush 3	Inverse	Very Inverse	Inrush 2	Inverse	Very Inverse
0	10.00	2.00	100	100	2.50	120	167	3.33	145	280	5.00	185	470
0.1	6.75	1.35	62	26	1.66	84	62	2.25	110	130	3.38	145	285
0.2	6.00	1.20	50	14	1.50	74	40	2.00	100	100	3.00	135	230
0.4	5.25	1.05	24	2	1.31	59	23	1.75	87	69	2.62	123	180
0.5	5.00	1.00	0	0	1.25	54	18	1.67	84	61	2.50	119	167
0.6	4.80				1.20	49	14	1.60	80	54	2.40	116	153
0.8	4.50				1.12	38	7	1.50	74	40	2.25	108	128
1.0	4.25				1.06	26	3	1.42	67	32	2.12	104	114
1.2	4.00				1.00	0	0	1.33	61	26	2.00	100	100
2.0	3.50							1.17	31	10	1.75	88	70
3.0	3.00							1.00	0	0	1.50	74	40
4.0	2.75										1.38	63	27
6.0	2.30										1.15	43	10
8.0	2.00										1.00	0	0

1. Peak loads of 28% and 33% of relay pickup currents are reasonably safe for inverse and very inverse relays, respectively, for outages up to 15 or 20 minutes. Of course, greater loads may be successfully picked up if the interruption is off peak or if the density of automatically controlled loads is low; and capacity additions can be postponed by the application of good judgment. Recent calculations using measured inrush currents much lower than the pessimistic values of Fig 1 gave critical loads roughly 140% of the values obtained from Fig 5.

2. Critical load increases slowly with increases in time setting. Doubling the time setting adds roughly 20% to the critical load. This indicates that any material gain in ability to pick up load would unduly sacrifice fault clearing speed.

3. The curves indicate that very inverse relays will pick up roughly 20% more load than the inverse type, given the same reference setting for minimum fault current. (But subsequent tests indicate that this advantage may be nearer 10%.) This indicates that little is to be gained by changing from inverse to very inverse relays.

Other Conclusions . . . The foregoing observations lead to the overall conclusion that induction overcurrent relay characteristics and time settings will go only so far toward solving the problem of heavy inrush when a feeder is re-energized after a long outage.

The sustained value of load current after the initial transient also severely limits the amount of load that can be picked up. This must be taken into account in sectionalizing schemes and other expedients for restoring load in pieces. For a sustained current of 1.75 times normal, as indicated in Fig 1, a load of more than 100/1.75 or 57% of relay tap setting cannot be carried without waiting long enough to regain diversity in the portions re-energized first. And it is quite probable that sustained currents as high as 2.5 times normal may be experienced after outages of 2 hours or more.

It should also be fully recognized that every step forward in increasing the amount of load a given relay can pick up brings us one step closer to that other problem of stalled motors due to low voltage near the ends of the feeders. This problem deserves intensive study aimed at exact quantitative answers.

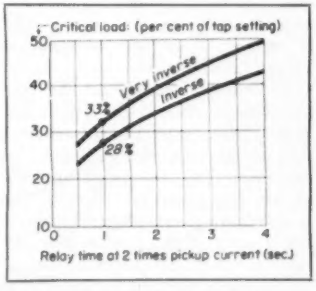


FIG 5—END PRODUCT of this study, curves show critical feeder loadings for inrush curve of Fig 1. Curves have been checked by experience and test

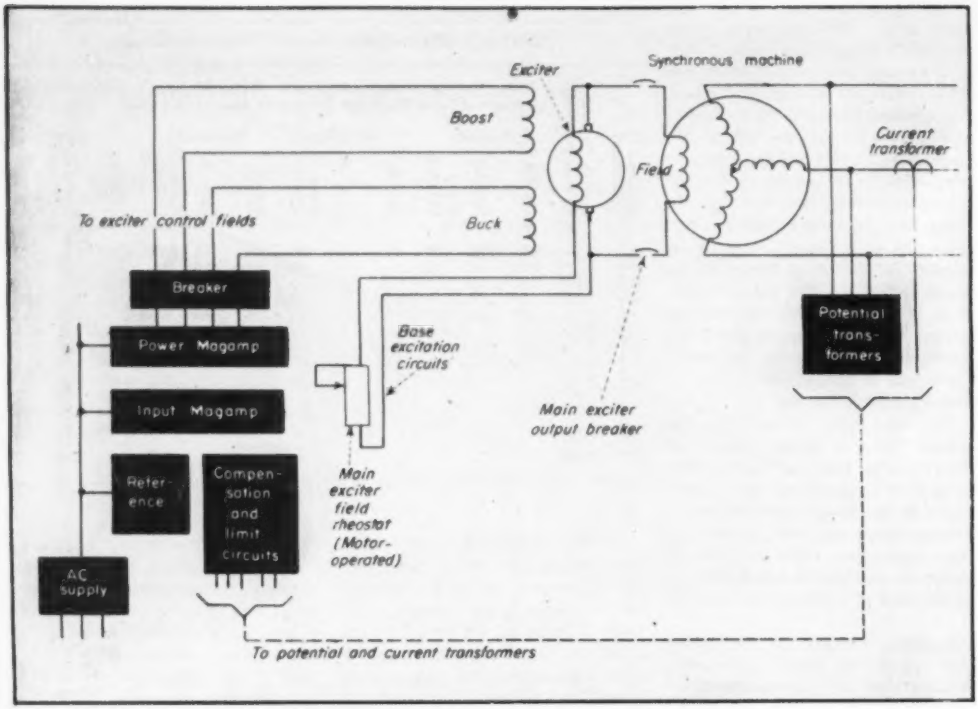


FIG 1—COMPENSATION AND LIMIT circuits are energized from synchronous machine terminal voltage through potential transformer, from phase current through a current transformer. Compensation circuits provide reactive-drop and line-drop compensation

New Magnetic Amplifier System Regulates Synchronous Machines

J. E. BARKLE
C. E. VALENTINE
J. T. CARLETON
Westinghouse Electric Corp
East Pittsburgh, Pa

For turbine generators, waterwheel generators or synchronous condensers, this novel regulating system provides a faster response than a rotating amplifier, while offering the maintenance advantages of a static against a rotating device and requiring no electronic components.

In this system (Fig 1) the synchronous machine has a self-excited main exciter, with a motor-operated field rheostat for manual control of excitation. The two regulating fields of the main exciter are energized by a power Magamp, through either a boost or a buck control field, to raise or lower the excitation voltage to the value required to maintain a fixed machine terminal voltage. Loss of separate excitation leaves the machine operating with self-excited field, while the separate buck-boost fields eliminate switching in the main exciter field circuit when changing from manual to automatic control.

The reference voltage is provided by a motor-driven permanent magnet generator with sufficient fly wheel effect to ride thru system disturbances. Equipped with a static compensating circuit, it delivers a reference voltage which varies less than 2% for supply frequencies between 70% to 140% normal, less than $\pm 0.1\%$ error for the usual $\pm 0.5\%$ base frequency shift. For water-wheel generators, runaway frequency still allows terminal voltage regulation.

Any deviation of terminal voltage causes a difference between the reference quantity and the voltage output of the compensation and limit circuits. This difference becomes an error signal, amplified by the input Magamp and supplied to the power Magamp. The power Magamp's two magnetic amplifiers energize either the boost control or the buck control field.

The same reference unit, and input circuits are used for all types and sizes of ac machines. The ratings of the power Magamp and the permanent-magnet m-g set are determined by the main exciter size and speed. The 420-cps frequency of the permanent-magnet generator results in a regula-

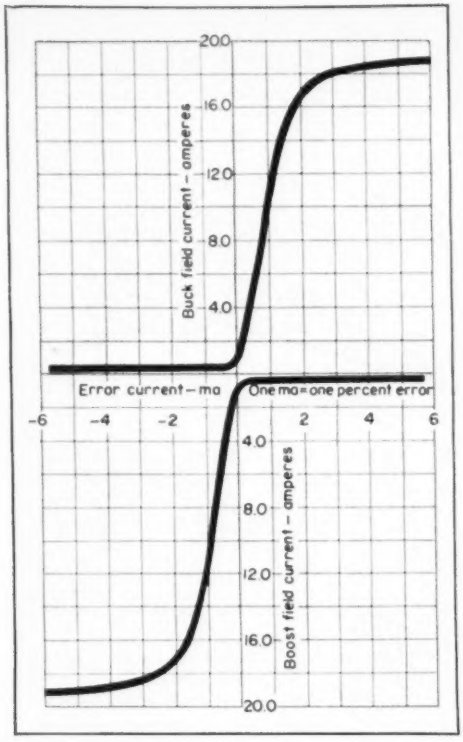


FIG 2—AMPLIFICATION of input and power Magamp, with current output as a function of error signal input, shows power Magamp is driven to its ceiling output with an error signal of two ma, or 2% terminal voltage deviation

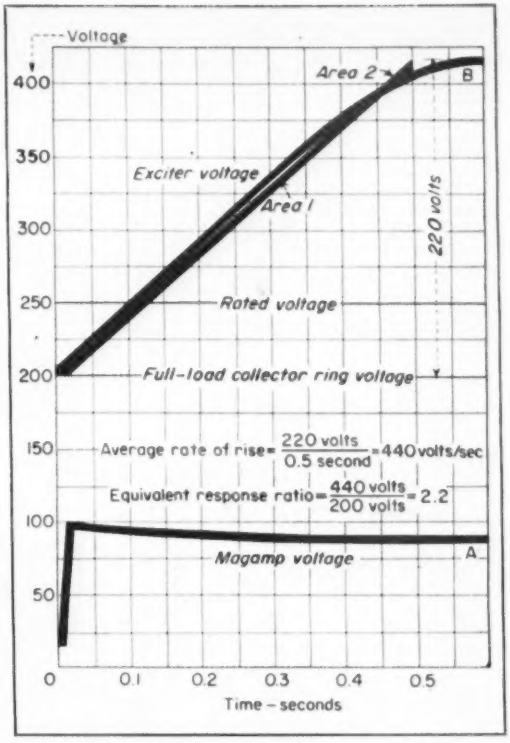


FIG 3—RATE OF RESPONSE of the Magamps and main exciter. Curve A shows power Magamp reaches ceiling voltage in 0.02 sec, or 1.2 cycles on 60 cps basis. Curve B shows output voltage of main exciter reaches its 420-v maximum in 0.6 sec

ting system that is fast and relatively small and stable.

System components are housed in a standard switch-gear cubicle, factory tested and adjusted. Installation takes minimum of checking, adjusting.

A close-regulating fast-response excitation system allows operation at loads beyond the power limit of the synchronous machine with fixed excitation, in the "dynamic stability" region. This system allows a greater steady state power limit, or permits reduced short-circuit ratios with corresponding decrease in machine size and weight.

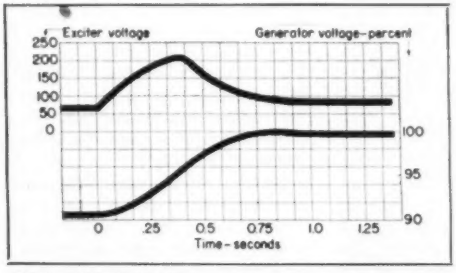


FIG 4—RECOVERY RATE for predetermined change of regulated voltage shows main exciter increases 72 to 212 v max in 0.38 sec, terminal voltage changes 9.2% in 0.72 sec. Absence of overshoot illustrates the system stability

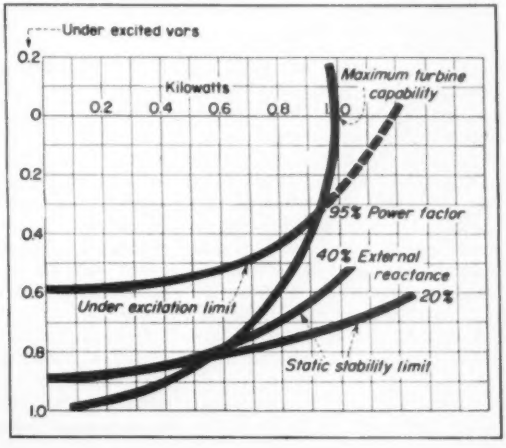
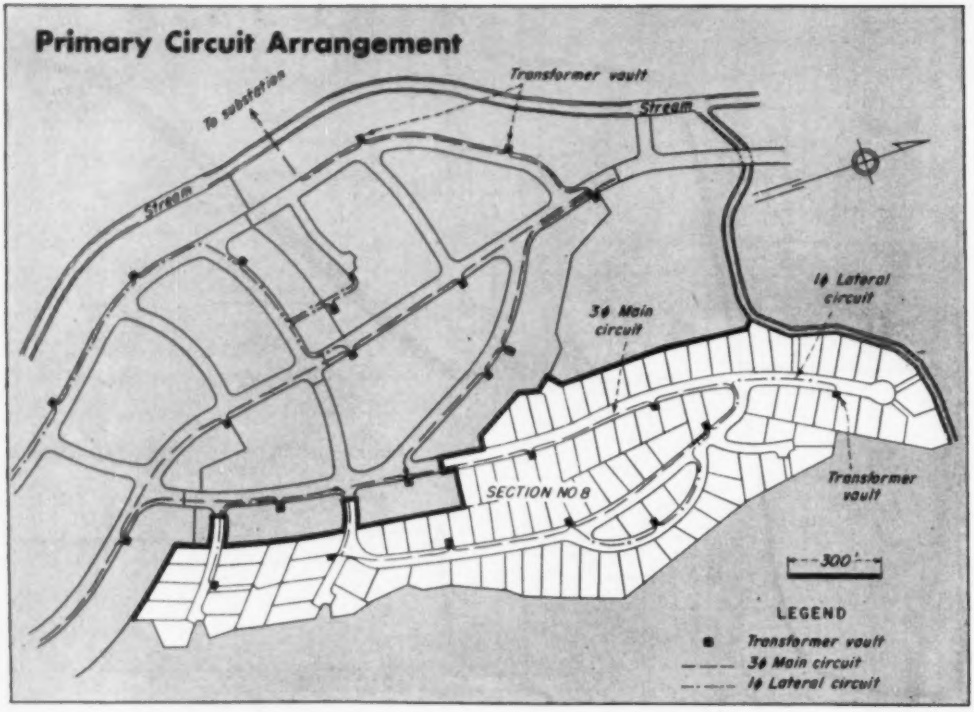


FIG 5 (RIGHT)—UNDEREXCITATION LIMIT coordinated with capability curve shows high degree of flexibility in adjustment of system to meet special requirements. Underexcitation limit prevents "pull-out" or loss of synchronism with system



PART OF AINA HAINA SUBDIVISION, with Section 8 shown marked off in lots. Primary circuiting in entire area indicated by dashed lines

Buried Cable Distribution Serves Hawaiian Subdivisions

Postwar boom in housing has been a buried underground boom. Hawaiian Electric Co Ltd has installed 17 miles since 1945

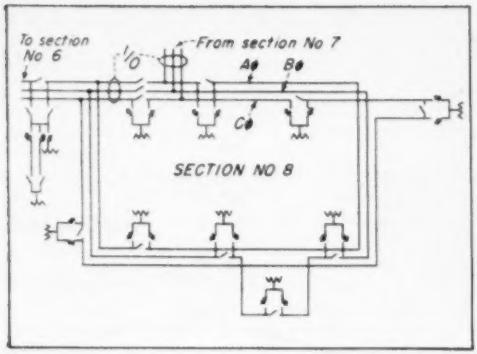
C. H. **WILLIAMS,** Principal Electrical Engineer, Hawaiian Electric Co, Ltd, Honolulu, Hawaii

Hawaiian Electric Co Ltd installs a buried cable distribution system in any residential subdivision if the subdivider will pay the cost difference between underground and an overhead system. The cost of a buried cable type distribution system ranges from 2.5 to 6 times the cost of an overhead system. Such underground systems are designed by the company and billing costs to the subdivider are determined from company estimates. However the cost of service to individual houses is not included. Each resident is charged the full cost of service from his property line to his meter location at the time the service is installed. In such underground systems the company shares the same trench with the telephone company for services as well as for the system proper.

Hawaiian Electric installed its first residential underground system 27 years ago. Then as now, primary and secondary cables were directly buried in the ground. Subdivision of large lots into smaller ones and the increase in demand per house have required the installation of additional transformers, but in no case has it been necessary to replace primary or secondary cables in these early underground systems.

Replacement of directly buried cables because of obsolescence would make this underground system impractical. To avoid this, the underground design is based on a demand of 4 kw per customer, averaged over the 17 houses normally served by one transformer vault. This will eventually mean 75-kva transformers in each vault. The average demand is

Based on a paper given before Pacific Coast Electrical Association, Inc., Fresno, California.



PRIMARY CIRCUIT OF SECTION 8 Three 1/0 single-conductor 5-kv shielded cables have synthetic rubber insulation and Neoprene jackets. Balance of cable is No. 4 single-conductor of same construction

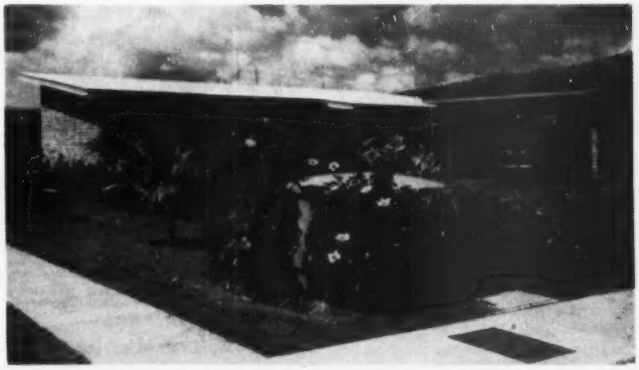
TRANSFORMER VAULT INSTALLED, buried 1 ft 6 in into ground. Housing is steel, 140-lb cover can be easily opened by one man. Base is standard 4-ft spun concrete pipe 2 ft 6 in high, cost $35

now 2 kva per lot in Aina Haina, with an average annual consumption of 7000 kwhr.

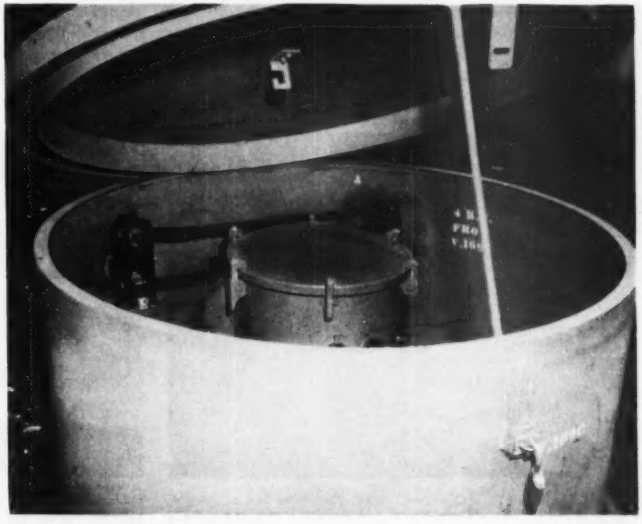
Transformers are 2400 v, connected phase to neutral on a 4160 v, solidly grounded common neutral system. One cutout to each transformer is normally open and one normally closed. Any primary cable failure can be isolated by manual switching and service restored without repairing or reconnecting primary cables. Secondary mains consist of two 4/0 single-conductor 600-v cables with synthetic rubber insulation and neoprene jackets, with a 1/0 common neutral. Secondary mains from adjacent transformers are not tied together, as one transformer cannot carry the load in two sections. Portable transformers mounted in trailers are used when transformers fail.

Normally the cables are installed between the sidewalk and the property line, 8 in from the property line. The first 6 or 7 in of fill is sifted through a ½-in mesh for the protection of the cables. After the 6 in of backfill, precast concrete slabs are placed over the cables for protection and the balance of the fill available is used. Precast slabs are superior because the possible damage to cables from the forming stakes is avoided and no wood is left in the trench to attract termites that might damage the cable.

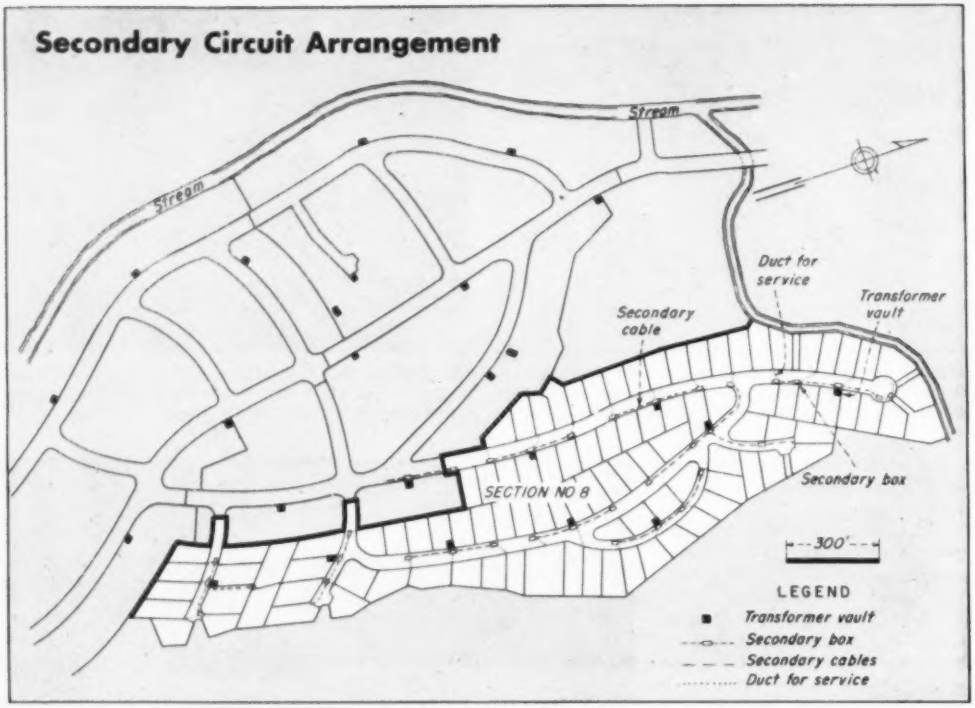
The sudivider's interest is in a low cost system because after it is installed it is no longer his problem. The utility, however, must insist on a system that will meet overhead system standards of satisfactory performance under all normal and reasonable emergency conditions. To meet these standards,



FINISHED INSTALLATION is blended into landscaping. Steel housing is locally made, costs $230 for special size to give space for sectionalizing equipment



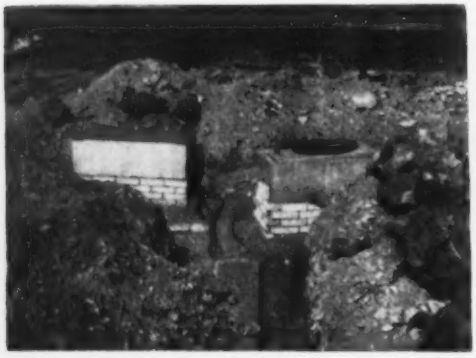
37½-KVA TRANSFORMER can be replaced by 75-kva. Two cutouts are accessible from front



SECONDARY CIRCUIT OF SECTION 8 showing secondary cables and boxes. A precast concrete box with ¼ in checker plate cover is installed at approximately every other property line. Transite conduit in concrete is installed across roads for service cables to houses

the underground system must be sectionalized so every transformer vault can be manually switched from a normal primary cable to an alternate primary cable. With a dual primary supply to each vault it is not necessary to have duplicate secondary feeders, if jumper cables are used in emergencies. Moreover, connections can be readily made in concrete secondary junction boxes.

Since the ground temperature is constant the year round in Hawaii there is no problem from ground heaving. However, the ground termite will go through almost any sheathing when he is foraging for food. This termite also attacks poles. Underground systems have fewer failures than equivalent overhead systems, but each failure is more expensive so there is no cost advantage. This would probably not be so in locations subject to winter storms.



PRECAST CONCRETE SECONDARY BOX. Telephone box is at right. Cables shown are single conductor, 4/0, 600-v and a 1/0 nuetrual and two No. 4 primaries. Concrete cover over cable is in foreground

SECONDARY BOX with cables and moles installed. Box has no bottom. Moles are insulated bus-bar with tapped openings so mechanical connections can be made with cables hot

WASHINGTON COMMENT

JESSE MOCK

As the political campaigns move towards a showdown, the tendency among mobilization agencies is to slacken controls.

There are, of course, considerations other than political which account for the gradual let-up on material and production controls. Metals, except for some types of steel, are in more plentiful supply. Defense agencies, with exception of the Atomic Energy Commission, are drawing less heavily on the scarce metals than was expected. Some of the intensity of the post-Korea mobilization effort has been dispersed.

Utilities Stake in the Controls Program

Whether the materials and production controls continue beyond next June 30 will be decided by the Congress which meets in early January. Right now, the thinking is that only a minimum of controls will be continued unless the Communist threat becomes more immediate. Congress will likely put off the decision as long as it can.

Does Power Industry Need Controls? . . . Already it is time for electric utility officials to begin thinking about their own stake in the controls program. Main question is: Should minimum controls be continued to assure necessary expansion of generating and transmission facilities? These would include some sort of metals allocation as well as production controls.

It is almost certain that priority treatment will be given to Defense Department and AEC projects for at least one year beyond next June 30.

A number of industry men now serving in the mobilization agencies believe CMP and most other controls should be suspended earlier than their expiration date next summer. Their argument is simply that no materials or production controls will be needed when metals become plentiful.

In sharp contrast is the view that control agencies directly affecting the power expansion program should be kept in operation at least until June 1954. This view is held by some of the more responsible utility men now serving in the mobilization agencies.

Utility Men Favor Controls until June 1954 . . . There are two main arguments to uphold this view. First, they argue, the outlook for such vital steel items as heavy-wall alloy pipe, plate, and even structural shapes is still dim. If the electrical utilities are to continue planned expansion, which includes a large obligation to furnish power for AEC, then some priority is needed to obtain these scarce steel items.

Second, they argue, the limited production capacity of heavy electrical equipment manufacturers will make production controls necessary beyond next June. By this they mean that some sort of control is needed to make sure that production and delivery of these heavy items is keyed to area defense needs.

Another argument that will be used involves the huge AEC power requirements which must be met by early 1956. Nearly one-sixth of the power expansion during the next three years will serve AEC facilities. The argument will be that controls are needed to protect this vital portion of power expansion.

There will be plenty of discussion on continuation of controls between now and the time Congress gets down to considering the matter during the first half of next year. There may be international developments that will finally determine the outcome in one way or the other.

In the meantime, utility officials should study the effects of the control program as it is now administered by National Production Authority and Defense Electric Power Administration. Is it aiding the industry, and, more important, is it contributing to the nation's defense?

There may be many new faces in the next Congress and the next administration. Those who decide will want the industry's views on the future of defense mobilization. They will be especially interested in any and all suggestions for improving the present methods and organizations.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Interlocking and instrumentation of spray desuperheaters for reheat boilers must be foolproof because wide fluctuations in steam temperatures (hazardous to the turbine) may occur if the control gets out of hand.

Resistance of steel to corrosion when surface-treated with zinc and aluminum (with or without vinyl jacket) will be studied by means of 4000 specimens subjected to various geographical and climatic variables.

Wet-compression of air-suspended water mist requires for efficiency that water particles be of size below 20 microns in diameter.

Grate areas over-large to try to conform to smoke ordinances are a poor way to strive for smokeless operation over a wide range of loading because some type of ash collector will probably have to be used anyhow.

Very fast and very slow fuses are outside the standardization which embraces only the moderately fast and slow characteristics.

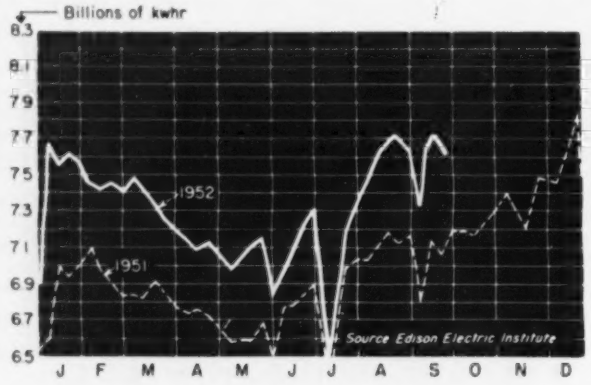
Excess over-fire air to promote furnace turbulence may do more harm in lowering the combustion temperature than good in providing oxygen for the combustion process. Preheating of the air is indicated. Steam in lieu of air is economically dubious.

Earth-moving equipment handles coal at 25 to 100% greater tonnage per hour than locomotive clamshell cranes and hopper-bottomed railroad cars.

Reversible turbine efficiency will be 87.8% as a turbine (18,720 hp at 89 foot head) and 89% as a pump (1800 cfs at 78 foot head).

Superfluous galleries and avoidable small differences in floor level necessitating stairways are doubly bad. They add to power plant handling cost and to wear and tear on the operators.

STATISTICS



Output Week Ended Sept 27—7,624,747,000 Kwhr

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
Sept. 27	+7.4	+9.0	+4.6	+7.4	+7.9	+11.2	+8.3	+10.5	—1.9	+9.1
Sept. 20	+10.1	+9.8	+6.0	+9.7	+11.6	+14.2	+24.9	+13.2	—2.5	+7.4
Sept. 13	+7.2	+7.1	+3.4	+6.8	+9.9	+12.3	+9.4	+13.7	—2.3	+7.4

Electric Power Statistics

		Latest Month's	Preceding Month	Year Ago
Peak Load (Million Kw)	July	66.7*	67.0	63.1
Capacity (Million Kw)	July	77.96	77.46	72.70
Production (Billion Kwhr)	July	32.52	31.53	30.39
Hydro		8.74	9.16	8.28
Fuel		23.78	22.37	22.11
Fuel Consumption				
Coal (Million Tons)	July	7.90	7.66	8.08
Oil (Million Barrels)		4.38	3.91	4.43
Gas (Billion Cu Ft)		98.71	89.29	83.20
Sales (Billion Kwhr)	June	27.67	27.94	26.66
Residential		7.44	7.52	6.63
Commercial		5.00	4.74	4.55
Industrial		13.20	13.83	13.55
Other		2.03	1.86	1.93
Net Income Class A & B Companies ($ Million)	July	64.52	69.88	56.11
Estimated Dec. 52 Peak (Million Kw)	July	80.1	80.0	78.8
Kwhr per Residential Customer (12 Month Average)	June	2,091	2,078	1,921
Revenue per Kwhr Residential Service (12 Month Average)	June	2.78¢	2.78¢	2.84¢
Canadian Production (Billion Kwhr)	July	4.84	4.99	4.63

Business Statistics

FRB Industrial Production Index†††	Sept.	222*	215*	223
Gross National Product Annual Rate ($ Billion)	2ndQtr	343.2	339.4	329.3
E. W. 5 Industry Production Index	Sept.	117.0*	113.9	123.5
ENR Construction Cost Index††	Sept.	122.9	122.7	113.8
BLS Consumer's Price Index	Aug.	191.1	190.8	185.5
NEMA Insulation Materials Sales Index†	July	470	500	494
NEMA Electric Appliance Sales Index†	July	234	258	181
NEMA Household Refrig. Sales Index†	July	197	192	97
Metal Prices. (Sept. 30)				
Copper, Conn. V., lb		$ .24½	$ .24½	$ .24½
Lead, N. Y., lb		.16	.16	.17
Zinc, prime Western E. St. Louis, lb		.13½-.14	.14	.17½
Tin, Straits, qual. N. Y., lb		1.21½	1.21½	1.03
Aluminum, ingot, base price		.20	.20	.19
Nickel, base price		.56½	.56½	.56½
Steel, billets, Pitts., ton		59.00	59.00	56.00
Steel, scrap, No. 1 heavy., Pitts., ton		45.00	45.00	45.00

* Estimated. † 1936=100 †† 1949=100 ††† 1937-39=100 (Unadjusted)

Geographic Distribution of Plant and Revenue

Class A and B companies operating in New York State received 11.6% of the total 1951 electric revenues according to Federal Power Commission data just released.

Pennsylvania ranks second with 9.1%, Illinois third with 7.5%, Ohio fourth with 7.1%, California fifth with 6.6%, and Michigan sixth with 5.0%.

These six states accounted for 46.9% of the electric revenues received by Class A and B companies.

On the basis of electric plant, 7.5% of the industry is located in New England, 22.3% in the Middle Atlantic States, and 24.8% in the East North Central region.

In total, 54.6% of the privately owned industry, on the basis of electric plant, is concentrated in the heavily populated and industrialized northeastern portion of the country. An additional 15.6% is situated in the South Atlantic and East South Central states.

In total, 70.2% of the privately owned electric utility industry is located east of the Mississippi.

Electric Plant & Operating Revenues 1951

	Plant $Million	Plant %	Revenues $Million	Revenues %
New England	1,567	7.5	447	8.5
Middle Atlantic	4,634	22.3	1,288	24.6
East North Central	5,139	24.8	1,345	25.7
West North Central	1,447	7.0	371	7.1
South Atlantic	2,604	12.5	653	12.5
East South Central	650	3.1	167	3.2
West South Central	1,612	7.8	378	7.2
Mountain	640	3.1	137	2.6
Pacific	2,463	11.9	451	8.6
United States	20,756	100.0	5,238	100.0

The Pacific region accounts for 8.6% of the electric revenues of Class A and B electric companies and 11.9% of the electric plant of such companies. The balance of the industry, accounting for 16.9% of the revenues and 17.9% of the plant, extends over West Central and Mountain regions.

Total investment in electric plant by these companies at the end of 1951 amounted to $20.8 billion. Of this amount, electric plant in service accounted for 19.2 billion or 92.5%.

The balance of construction work in progress at the end of the year ($1.2 billion) accounted for 5.9% of the total. Electric plant acquisition adjustments, representing the excess of the purchase price of electric utilities property over its original cost, amounted to $0.3 billion or 1.2%.

FINANCIAL

SEC Changes the Rules . . .

. . . on the distribution of the so-called 'red herring' prospectus. It will also accelerate the 20-day waiting period.

As any broker can tell you, the Securities and Exchange Commission's "Truth in Securities" rules have fallen somewhat short of their goals.

Instead of shedding light, the procedures laid down by the commission have been so cumbersome that buyers often went without the facts uncovered. And dealers have been reluctant to push written information for fear of breaking the law.

New Set of SEC Rules . . . But now SEC has streamlined these procedures. Last week it put out a new set of rules designed to give customers—in readable form and in plenty of time—the important facts they need to know for an intelligent investment decision. The action applies to all registration statements filed on or after October 27, 1952.

The changes centered largely in the prospectus and the requirements for advertising and distributing it.

Under the old rules, the underwriter of new securities had to wait 20 days from the date of filing an amended registration statement before making a sale. All they could do during this period is send out one copy of the so-called "red-herring" prospectus to each dealer in the group. (A red-herring is a preliminary prospectus with final terms and prices lacking but with a warning that it isn't an offer to sell.)

During the waiting period, dealers can do no advertising nor can they furnish any information through the mails. Indeed, even after the effective date—when the waiting period is over—there's a limit to what can go into an ad: Only the name of the security issuer, the type and price of the issue, and where the prospectus can be obtained.

The rules require that a prospectus "must precede or accompany" the first contact between dealer and customer. But there's nothing in the law to prohibit a dealer from telephoning a customer, making a sale on the spot and sending the customer the prospectus with the confirmation of sale. As things stood, the law was being obeyed, but the customer was still buying out of ignorance. There was simply no inducement for the dealer to get the prospectus out early.

Under the rules, SEC is going to use a powerful inducement to better dissemination of information: Acceleration of the 20-day waiting period. Acceleration isn't new; SEC has shortened the period in the past where circumstances warranted. But the commission will hereafter advance the effective date only if underwriters distribute a short, fact-filled identifying statement to a wide number of potential investors.

Better for the Underwriters . . . Acceleration could be worth a lot to underwriters. Reason: The price of the securities, underwriting commissions, etc., must be fixed in the registration statement before SEC will approve it. But a lot can happen to the market in 20 days—enough perhaps to make handling the issue unprofitable.

After Oct. 27, underwriters will be able to send out any number of red-herrings to dealers in the group, during the waiting period, along with copies of the identifying statements. Dealers, in turn, can mail out or advertise the information to customers—in effect, screening their list for interested prospects.

Of course, there still cannot be a sale before the effective date. But if the customer has been properly plied with information, SEC will hasten that day.

What things make up a satisfactory identifying statement? SEC gives underwriters a wide option, including:

- Notice that the statement isn't an offer to sell (a must).
- Name and type of business of issuer.
- Price, yield, redemption, convertibility and warrant provisions.
- Type of exchange on which the security will be listed.
- Opinion on legality as an investment for savings banks, insurance companies, fiduciaries.
- Tax-exemption, if any.

$3 Billion Expansion Planned

The New England electric companies will spend $3 billion in an expansion program by 1975, Howard J. Cadwell, chairman of the Electric Co-Ordinating Council of New England and president of the Western Massachusetts Electric Co estimated recently.

He said the region will need between 9 million and 12 million kw in additional generating capacity in the next 23 years. This is based, he pointed out, on studies of engineers from all the participating companies, covering a 30-year period starting with the end of World War II. The program foresees a quadrupling of regional power generating resources in that time.

This program, he stated, represents a conservative estimate of the cost of the added generating, transmission and distribution equipment involved. This figure is based on 1952 building cost levels and will be higher if the present inflationary cycle continues.

"Both steam and hydro power installations are included," Cadwell said, "and the program maps continued extension and strengthening of the transmission line grid already linking Massachusetts, Connecticut, Vermont, Rhode Island and New Hampshire into one big electric neighborhood where each community benefits from the overall resources of the entire area.

"We are already going full blast and since World War II the six-state electric power supply has already been upped 62%, a remarkable record in view of the many post-war problems involved in new construction. By 1955 New England's generating capacity will reach over 5 million kw, an 85% gain. Expansion in use of electricity in many fields over the last 20 years gives promise of equally important developments over the next two decades. Ample electric power facilities, planned, designed and produced by experienced public service men working as a team, will insure that in the future as well as in the past, there will always be plenty of power in New England."

Today in Utility Finance

YIELDS (%)

Quality	Bonds			Preferred Stocks			Common Stocks		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
DATE									
1952									
Sept. 25	**2.99**	**3.03**	**3.16**	**4.10**	**4.26**	**4.61**	**5.18**	**5.59**	**5.96**
Sept. 18	2.98	3.02	3.16	4.11	4.25	4.61	5.22	5.61	6.03
3rd 1952	2.99	3.03	3.16	4.10	4.26	4.61	5.18	5.59	5.96
2nd 1952	2.95	3.00	3.09	4.05	4.31	4.60	5.38	5.85	6.42
1st 1952	2.95	2.99	3.13	4.11	4.29	4.66	5.35	6.03	6.47
4th 1951	3.02	3.07	3.21	4.32	4.50	4.91	5.42	6.18	6.84

Data: Reis & Chandler, Inc.

EARNINGS

Company	Period Month Ended		Net Income 1952	Net Income 1951	Earnings Per Common Share 1952	Earnings Per Common Share 1951
Arkansas Power & Light	12	August	$5,921,733	$4,429,956	$....	$....
California Oregon Power	12	August	2,465,249	2,373,646	1.95	....
Houston Lighting & Power	12	August	7,882,261	6,754,527	....	....
Kansas City Power & Light	12	August	5,519,477	4,363,419	....	....
Louisiana Power & Light	12	August	2,903,834	2,520,627	....	....
Middle South Utilities	12	August	12,845,982	10,387,091	2.04(a)	1.79(a)
Mississippi Power & Light	12	August	3,629,762	2,868,194	....	....
New York State Electric & Gas	12	August	7,419,404	5,635,381	2.26(b)	1.91(b)
Portland General Electric	12	August	3,645,039	3,434,882	2.69(c)	2.75(c)
			1951	**1950**	**1951**	**1950**
Knoxville Utilities Board	12	December	$1,651,182	....	$....	$....

Notes—(a) Including tax reduction due to amortization of emergency facilities; (b) Based on 2,696,950 shares outstanding in 1952 and 2,396,950 shares in 1951; and (c) Based on 1,354,167 average outstanding shares in 1952 and 1,250,000 shares outstanding on Aug. 31, 1951.

FINANCING

Company and Description	Amount of Offering (000)	Offering Price	Yield to Public
WEEK OF SEPTEMBER 25-OCTOBER 1			
Bonds			
Washington Water Power—1st mtg 3½% 1982	$30,000	101.871%	3.40%
Common Stock			
Utah Power & Light—167,500 sh (being offered stockholders on 1-for-10 basis, record Sept. 8 to expire Sept. 25; stockholders allowed over-subscription privileges)	$4,816	$28.75	6.26%
Idaho Power—225,000 sh	9,113	40.50	4.44
WEEK OF OCTOBER 2-8			
Common Stock			
California Electric Power—350,000 sh	$.....	.....	.....
California Oregon Power—250,000 sh	.....	.....	.....
Sierra Pacific Power—26,775 sh (to be offered preferred holders on 1-for-6 basis and commonholders on 1-for-12 basis, record Oct. 6 to expire Oct. 20; Stone & Webster Securities Corp—Dean Witter & Co. underwriters)	.....	.....	.....
SCHEDULE FOR OCTOBER TO DECEMBER			
Bonds			**Bid Date**
California Oregon Power—1st mtg 1982	$7,000	.....	Oct. 14
Utah Power & Light—1st mtg 1982	10,000	.....	Oct. 14
Carolina Power & Light—1st mtg 1982	20,000	.....	Oct. 20
Virginia Electric & Power—1st mtg 1982	20,000	.....	Oct. 21
Long Island Lighting—1st mtg 1982	20,000	.....	Nov. 18
New Orleans Public Service—1st mtg 1982	6,000	.....	Dec. 15
Common Stock			
Long Island Lighting—599,942 sh (being offered commonholders on 1-for-7 basis, record Sept. 24 to expire Oct. 9; Blyth & Co.—First Boston Corp. underwriters)	$9,299	$15.50	5.81%
Iowa Public Service—150,122 sh (being offered commonholders on 1-for-8 basis, record Sept. 25 to expire Oct. 14; stockholders to be allowed over-subscriptions; no underwriting)	3,153	21.00	6.67
Hawaiian Electric—50,000 sh (being offered commonholders on 1-for-10 basis, record Oct. 3 to expire some time in Nov.; no underwriting)	1,000	20.00	10.00*
UNSCHEDULED AND UNDER CONSIDERATION			
Bonds			
Central Maine Power—1st general mtg	$6,000	.....	.....
Kansas City Power & Light—1st mtg	12,000	.....	.....
Common Stock			
Central Maine Power	$5,000	.....	.....
Duquesne Light—250,000 sh	.....	.....	.....

Notes—* Dividends are subject to a 2% Hawaiian witholding tax. If this tax is eliminated, the yield would be 9.8c%.

CALENDAR

Edison Electric Institute
Prime Movers Committee, Roosevelt Hotel, New Orleans, La., Oct. 6-7; AEIC joint meeting, Meter-Service Committees, Mayflower Hotel, Washington, D. C., Oct. 6-8; Electrical Equipment Committee, Hotel Roosevelt, New York, Oct. 13-14; Transmission - Distribution Committee, Hotel Adolphus, Dallas, Tex., Oct. 23-24.

Iowa Utilities Association
Management Conference, Fort Des Moines Hotel, Des Moines, Oct. 6-7.

University of Texas
Power Distribution Conference, Department of Electrical Engineering, Austin, Oct. 6-8.

Public Utilities Advertising Association
Region 4 Meeting, French Lick Springs Hotel, French Lick, Ind., Oct. 7-8.

Indiana Electric Association
Annual Convention, French Lick Springs Hotel, French Lick, Ind., Oct. 8-10.

Missouri Valley Electric Association
Sales-Rural Conference, Hotel President, Kansas City, Mo., Oct. 8-10.

Pennsylvania Electric Association
Transmission - Distribution Committee, Penn-Alto Hotel, Altoona, Pa., Oct. 9-10; Fall Meeting, Systems Operation Committee, Hotel Roosevelt, Pittsburgh, Oct. 16-17; Industrial Committee, Bedford Springs Hotel, Bedford, Pa., Oct. 23-24; Fall Meeting, Meter Committee, Fort Stanwix Hotel, Johnstown, Pa., Oct. 23-24; Prime Movers Committee, Hotel Roosevelt, Pittsburgh, Oct. 30-31; Communications Committee, Hotel Syracuse, Syracuse, N. Y., Nov. 6-7; Fall Meeting, Relay Committee, Robert Treat Hotel, Newark, N. J., Nov. 13-14.

American Institute of Electrical Engineers
Fall General Meeting, Jung Hotel, New Orleans, Oct. 13-17; Middle Eastern District Meeting, Commodore Perry Hotel, Toledo, Oct. 28-30; Conference on Machine Tools, Ten Eyck Hotel, Albany, Oct. 29-31; Special Technical Conference on Electrically Operated Recording and Controlling Instruments, Benjamin Franklin Hotel, Philadelphia, Nov. 17-18.

Southeastern Electric Exchange
Accounting Conference, Jung Hotel, New Orleans, La., Oct. 16-17; Sales Conference, Thomas Jefferson Hotel, Birmingham, Ala., Oct. 29-31.

Great Lakes Power Club
Fall Meeting, Harris Hotel, Kalamazoo, Mich., Oct. 16-17.

American Welding Society
33rd National Fall Meeting, Bellevue-Stratford Hotel, Philadelphia, Week of Oct. 19.

National Association of Suggestion Systems
16th Annual Convention, Drake Hotel, Chicago, Oct. 20-21.

National Farm Electrification Conference
Statler Hotel, Detroit, Mich., Oct. 20-21.

National Electrical Industries Show
Sponsored by Eastern Electrical Wholesalers Association, 69th Regiment Armory, New York, Oct. 21-24.

National Association of Railroad and Utilities Commissioners
Annual Meeting, Hotel Marion, Little Rock, Ark., Nov. 10-13.

National Electrical Manufacturers Association
Annual Meeting, Haddon Hall Hotel, Atlantic City, N. J., Nov. 10-13.

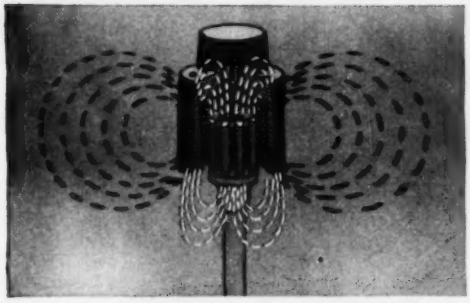
American Standards Association
34th Annual Meeting, Waldorf-Astoria Hotel, New York, Nov. 25.

American Society of Mechanical Engineers
Annual Meeting, Statler Hotel, New York, Nov. 30-Dec. 5.

Institute of Radio Engineers
Joint Electronic Computers Conference with American Institute of Electrical Engineers, Park Sheraton Hotel, New York, Dec. 10-12.

QUALITY-CONTROL STAND REGULARLY TESTS SAMPLE METERS—CHECKING ACCURACY OF BOTH OPERATORS AND PRODUCTION TEST PANELS

New G-E Meter Movie Shows How I-50's Are Certified



ANIMATED SEQUENCE, one of several, shows how disk is magnetically suspended. Side thrust against guide bushings is 2000 times less than total bearing pressure of conventional meters.

"Accent on Accuracy"—new sound, color film shows development, construction of I-50 meters

General Electric's new full-color motion picture—"Accent on Accuracy"—is now available for showings by utilities. It describes the radical design developments, manufacturing techniques, and quality control procedures that have made possible factory-certification of I-50 meters.

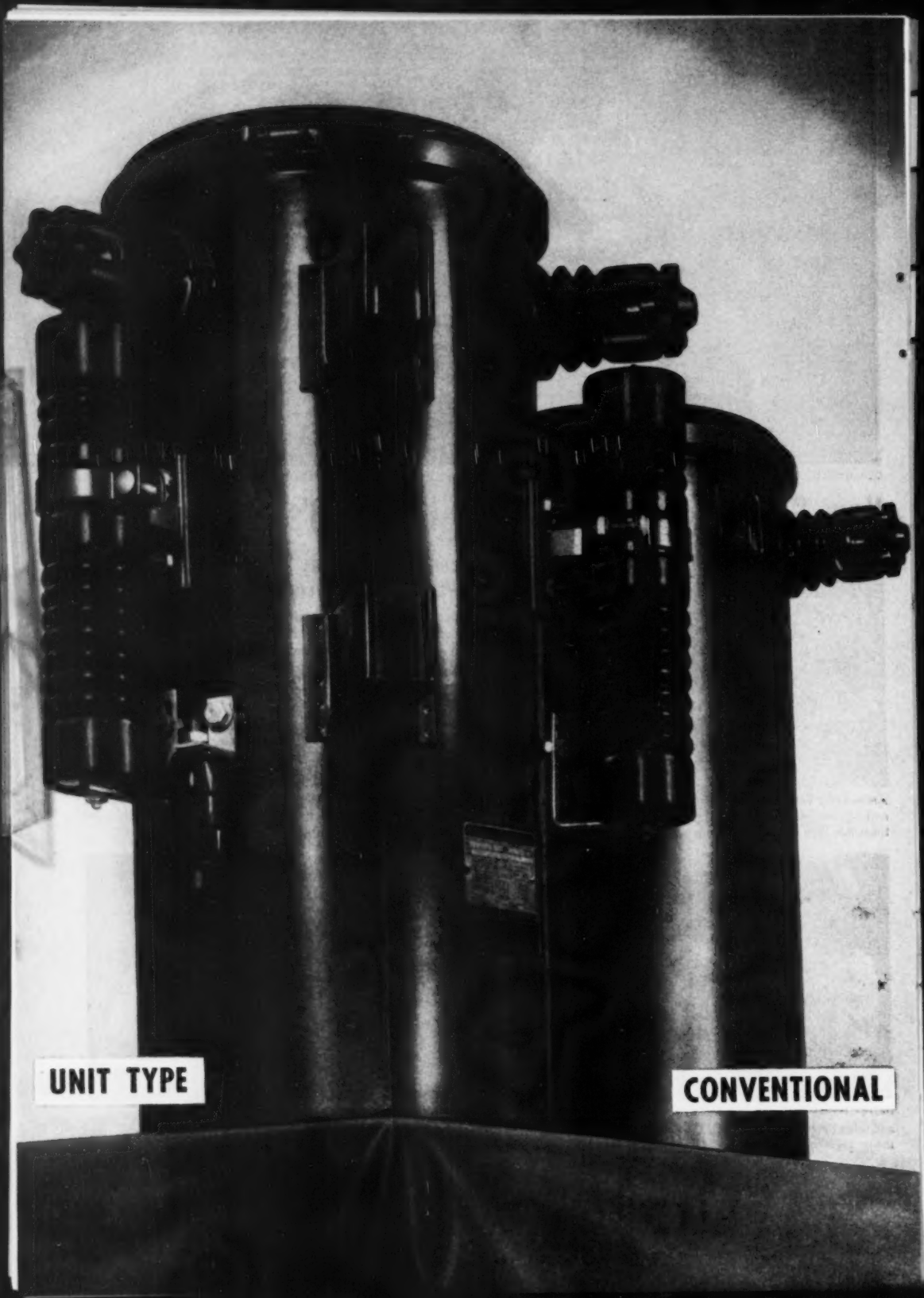
Animated sequences are included. These show the importance of meters, operation and development of the watthour meter, and how the I-50 floating disk works.

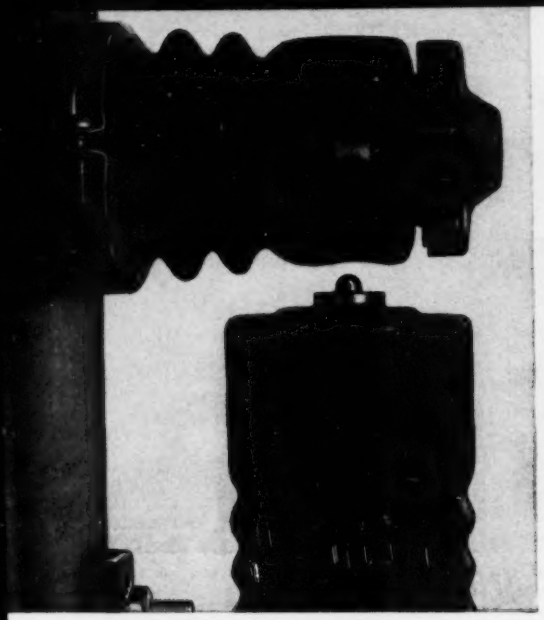
"Accent on Accuracy" is offered to any utility—both for employee information and to show customers the story behind services. If you would like to see or use this 16-mm film, call your local G-E representative or write Section: 601-83, General Electric Company, Schenectady, N. Y.

INSPECTIONS FOR CLEANLINESS are important because lint and other particles cause most performance rejects. Film shows many precautions which are taken during manufacturing.

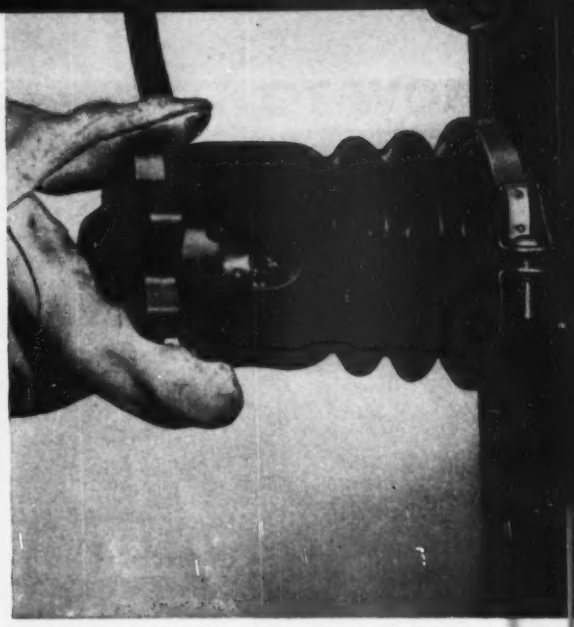
PERMANENT LAG ADJUSTMENT is made on stator. As film shows, operator tests, then equipment automatically punches holes for permanent calibration. Process eliminates need for further adjustment.

GENERAL ELECTRIC


UNIT TYPE
CONVENTIONAL



NEW PELLET ARRESTER on General Electric unit-type transformer is isolated from the high-voltage lead by an external gap. The gap keeps the arrester at ground potential and prevents line grounding in case of arrester damage.



NEW TANK-WALL BUSHING on both conventional and unit-type G-E transformers allows safer, faster connections from either side of the bushing—without tools. A twist of the wrist is all that's needed to clamp cable securely.

Why new G-E transformers are easier to connect, better protected

General Electric Spirakore* transformers are now easier to install. Both the conventional and the unit-type have new tank-wall high-voltage bushings which eliminate exposed live parts—permit safer, faster connections without tools. Cable can be brought in from either side of the new bushings; its insulated cap cannot drop off when unscrewed.

EXTERNAL GAP PROTECTS UNIT-TYPE

The compact design of the new unit-type G-E transformer includes a breaker, a high-voltage fuse, and a new gapped Pellet arrester. The external gap isolates the Pellet arrester from the high-voltage lead. Elimination of the positive electrical connection keeps the arrester at ground potential and prevents line grounding in the case of arrester damage.

PROTECTION THAT LASTS

Because the Pellet arrester is a valve-type arrester that has unlimited interrupting capacity, you can apply G-E unit-type transformers anywhere on your system without regard to system short-circuit current. And because a valve-type arrester is not eroded by discharge, the Pellet arrester offers protection that lasts indefinitely.

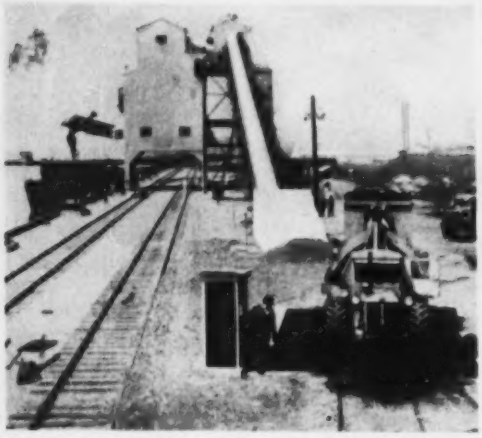
THE BEST PACKAGE YOU CAN BUY

Nitrile gaskets at every opening keep G-E Spirakore transformers moisture-proof. A one-piece cover band produces uniform gasket pressure around the entire rim, facilitating inspection and maintenance. Two baked-on paint coats provide superior resistance to weathering, water absorption, and abrasion. These features plus Spirakore design with its lower losses, greater short-circuit strength, and superior regulation, make a G-E transformer the best package you can buy.

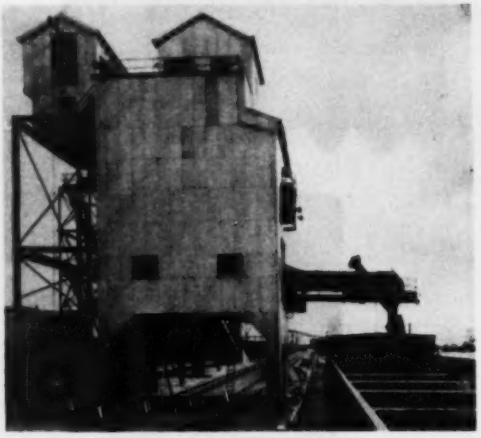
These new G-E Spirakore transformers, both conventional and unit-type, are available in ratings 5 kv and below, 100 kva and below. For more information see your nearest Apparatus sales office, or write to Section 402-128, General Electric Co., Schenectady 5, N. Y.

Reg. Trademark of General Electric Company

GENERAL ELECTRIC



SELF-POWERED EARTH-MOVERS bring coal to conveyor belt which lifts coal to elevated bin where it is stored



COAL CHUTES AND BOOM CONVEYORS load coal into barges, railcars, or trucks for transport to substations

How Philadelphia Electric Increased Its Coal Storage

Philadelphia Electric Co has doubled the storage capacity of its Northeast Coal Storage Yard by installing modern coal-handling equipment. Now capable of storing 1,000,000 tons, the emergency fuel supply yard can feed five PE generating stations on the Delaware and Schuykill Rivers.

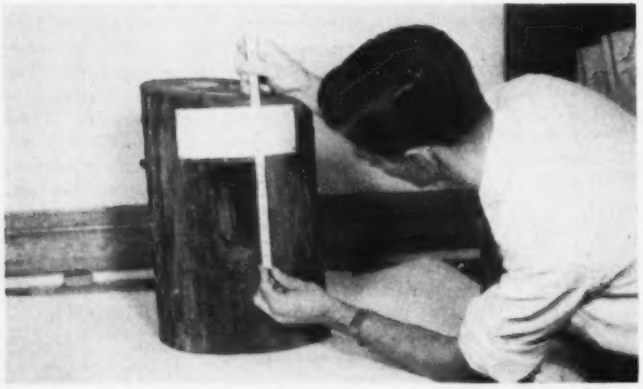
In the old yard, coal brought by railroads was piled by locomotive crane between tracks on 110-ft centers. Rail space is now used for storage.

Coal is brought to the yard by barges and stockpiled by self-propelled earth-movers. These machines were designed for construction work and can carry 11 tons of coal up a 10% grade. The height of the stockpile is limited only by the grade the earth-movers can climb.

Outgoing coal is carried by the same earth-movers to a hopper and fed to an inclined belt conveyor. The conveyor carries it to an elevated bin in the coal tower, where it is fed by boom conveyor or chute into barges, railcars, or trucks.

Costing $2,500,000, the new coal-handling equipment can handle 800 tons per hour. A 1500-ft. concrete sea wall, with extended double railroad tracks 1200 ft along the wharf, means four barges can be loaded and moored at the wharf. With additional dredging, mooring space can be doubled.

"Operation Woodpecker" Poses Maintenance Problem

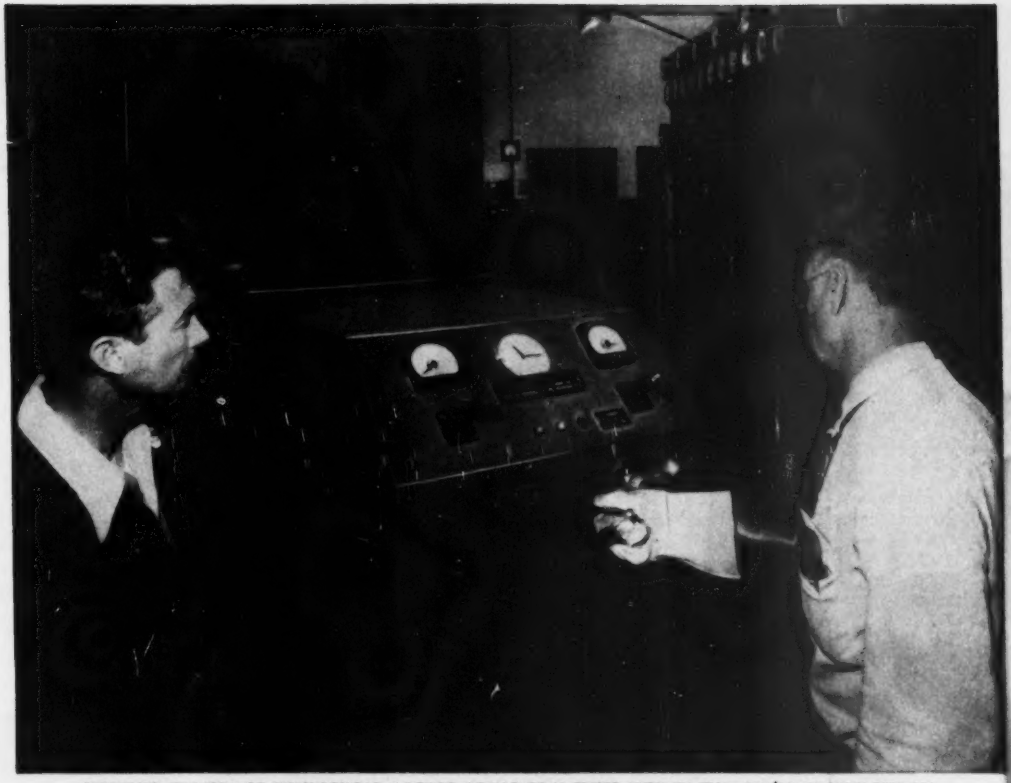


WOODPECKER DAMAGE is examined by R. E. Murphy of Connecticut Power's engineering department on pole section removed from Torrington-Tariffville 115-kv line

Sixty-four heavily creosoted pine poles carrying a 115-kv, H-frame line of the Connecticut Power Co in Harwinton have lately been damaged by pileated woodpeckers to a point requiring replacement of 31 and repair of 33. Lewis H. Foley, hydro and transmission superintendent, states that the average damaged pole has 4 sizeable borings, some being almost completely bored through to a depth of 9 in. In all cases the holes have been bored between the crossarms and ground line. A maximum of 8 holes has occurred in some poles.

The repair procedure involves the use of one-third pint of osmoplastic compound per pole. The average time for applying this compound is about

(*Continued on page* 120)



DIELECTRIC STRENGTH OF SYNCHRONOUS MACHINE ARMATURE IS TESTED WITH 75 KVA, 230/30,000-VOLT TEST SET.

High-potential tests simplified

West Coast utility uses G-E portable a-c test set to make a routine job of testing synchronous machines . . . at a substantial saving in time and cost.

When a major West Coast utility overhauls the synchronous machines at its various stations, it checks the dielectric strength of the armatures.

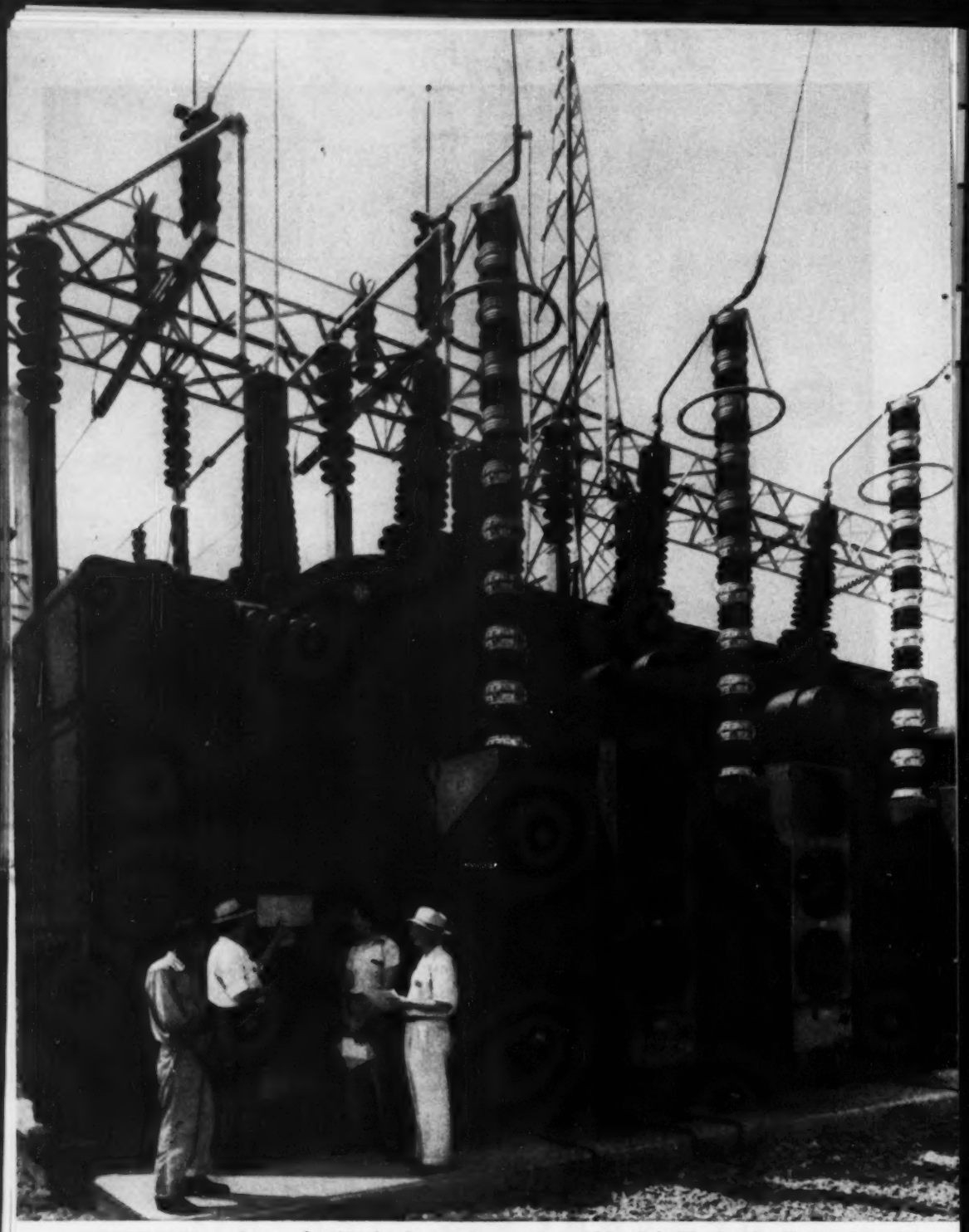
Until recently, this required a large amount of cumbersome equipment that had to be transported from the Test Department to the substations and generating plants. And because the tests involved a complicated arrangement and many connections, specially trained personnel were needed.

Now a more nearly routine job. Today, trained test men make the same tests in practically a routine manner. That's because the utility now uses several General Electric portable a-c high-potential test sets. These compact, self-contained units come complete with all necessary meters and controls, some of which formerly were separate devices requiring assembly and connection for each unit tested. They eliminate much of the hazard of the older method . . . and at a substantial saving in time and maintenance costs. And since each weighs only 3400 pounds, it is easily moved from one location to another.

General Electric portable a-c high-potential test sets can be obtained for practically all testing requirements. They are available in standard ratings from 2000 to 150,000 volts, 0.25 to 25 kva. Higher kva ratings can also be obtained. For more complete information, write for Bulletin GEC-612. *General Electric Co., Schenectady 5, N.Y.*

401-800

GENERAL ELECTRIC



ONE-PIECE TANK contains record 156,000-kva "concentric layer" autotransformer and the series transformer for load-ratio-control. Installed at West Frankfort, Ill., this unit is cooled by the directed flow of forced oil through the windings and core.

230-kv "CONCENTRIC LAYER" autotransformer packs record 156,000 kva in one-piece tank

New unit for Illinois Power Company shipped upright in one-piece tank to minimize installation expense

Built for the Illinois Power Company of Decatur, Illinois, this G-E "concentric layer" autotransformer rated 156,000 kva (output) will tie a 230-kv system to a 138-kv system to help supply power for an atomic energy plant at Paducah, Kentucky.

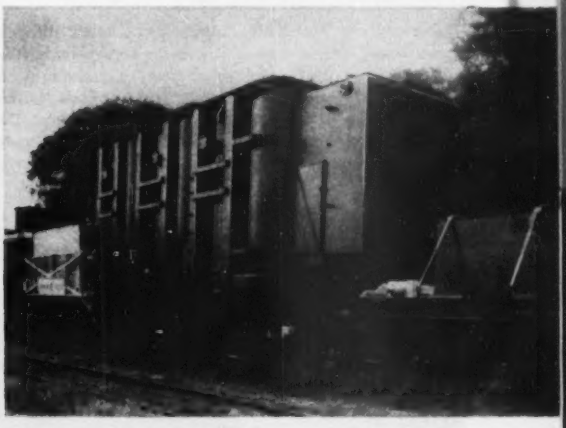
Weight, size held down. The use of "concentric layer" high-voltage windings permitted the entire core and coil assembly, including the load-ratio-control series transformer, to be fitted into a one-piece tank which was small enough to be shipped upright, ready for installation.

In this winding, the conductor is wound in concentric layers separated by cylinders of insulation. These layers are connected in series so that voltage stresses between the layers and between high- and low-voltage windings are only the voltage of one layer. Bulky insulation between high- and low-voltage windings is not required since the necessary insulation is distributed efficiently throughout the winding. Weights and dimensions are substantially reduced permitting a larger kva unit to be shipped upright in a single-section tank.

High impulse strength is inherent in "concentric layer." There are no harmful oscillations under impulse because voltage distribution is essentially uniform throughout the winding. As a result, voltage stresses can be calculated accurately, and insulation applied precisely.

For power systems, 161 to 330 kv and higher. If you use or contemplate using 161 to 330 kv or above in high-capacity ratings, it will pay you to review the data on "concentric layer" design. Ask your local G-E Apparatus Sales representative for bulletin GER-129, or write to Section 401-36, General Electric Company, Schenectady 5, New York.

LOWER WEIGHT and smaller size of "concentric layer" design results from improved space factor—elimination of bulky insulation between low- and high-voltage windings.

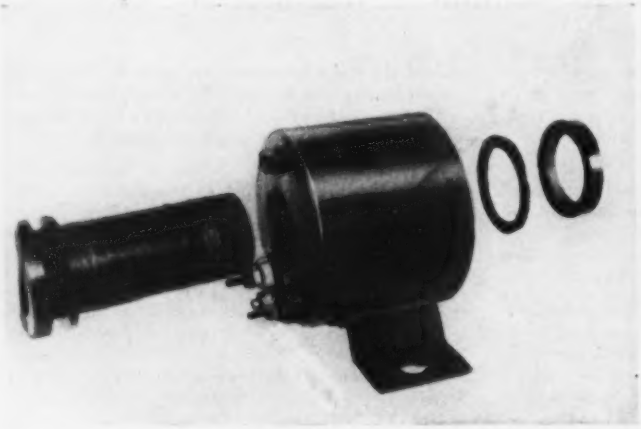


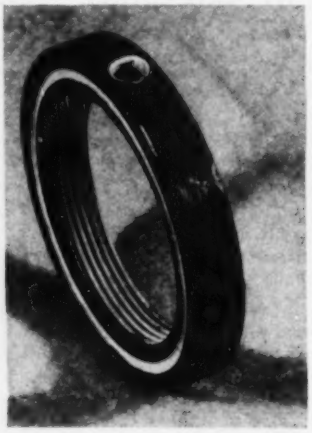
SHIPPED UPRIGHT on a special drop-frame railroad car, this 156,000-kva "concentric layer" unit was installed easily without the use of cranes or other hoisting facilities.

GENERAL ELECTRIC

1 hr per pole, with an average of 3 holes per pole. The field application is as follows: The bird hole is first cleansed of any possible dead wood and then thoroughly sterilized by applying the compound to all the inside surface of the hole with a brush. A mixture of sawdust and compound is then packed in the hole with a trowel. When the hole is filled to the surface of the pole it is covered with tar roofing paper which is stapled to the pole by a heavy-duty hand stapler. Enough sawdust is used to form a consistent paste. If the compound is used alone it is insufficiently thick and tends to flow. Mixing compound and sawdust insures the necessary consistency and provides a filler which saves considerable quantities of the compound.

About 1.5 sq ft of roofing paper is required per hole. So far, the average cost of repairs has been slightly under $6, including labor, automobile and material, against an average cost of pole replacement on this transmission line of about $500. As an experiment the company has covered several poles too weak to withstand another bird hole with ½ x ½-in. galvanized 19-gage screen from the top to about 12 ft above ground line. The estimated time to complete the entire job including repair and replacement is 90 days, and the overall cost about $15,000.

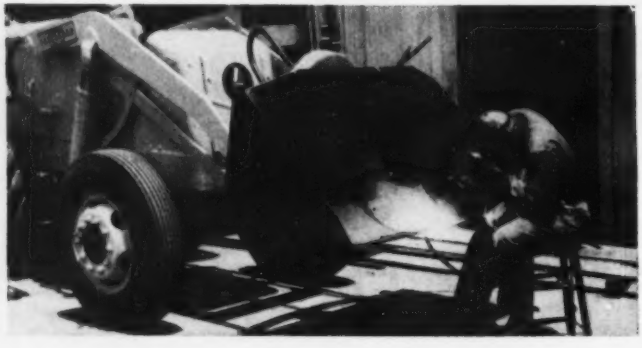




Porcelain Bushings Replaced with Fiber at 66% Savings

Replacement of broken bushings in outdoor through-type current transformers can be made for approximately one-third the cost of a new transformer. The saving is the result of the application of maintenance methods learned on older types of equipment plus a little ingenuity. Design of the transformer appears to be such that the bushing cannot be replaced either by the utility or manufacturer. But the porcelain bushing was completely removed, a fiber tube was inserted, and fiber end rings and gaskets were put on the tube. Glyptal was used on the gasket surfaces and threads. The bushing being replaced, the transformer is ready again for service in a very short time.—E. H. Tyson, Supt of Meters, Pennsylvania Power & Light Co, Hazelton, Pa.

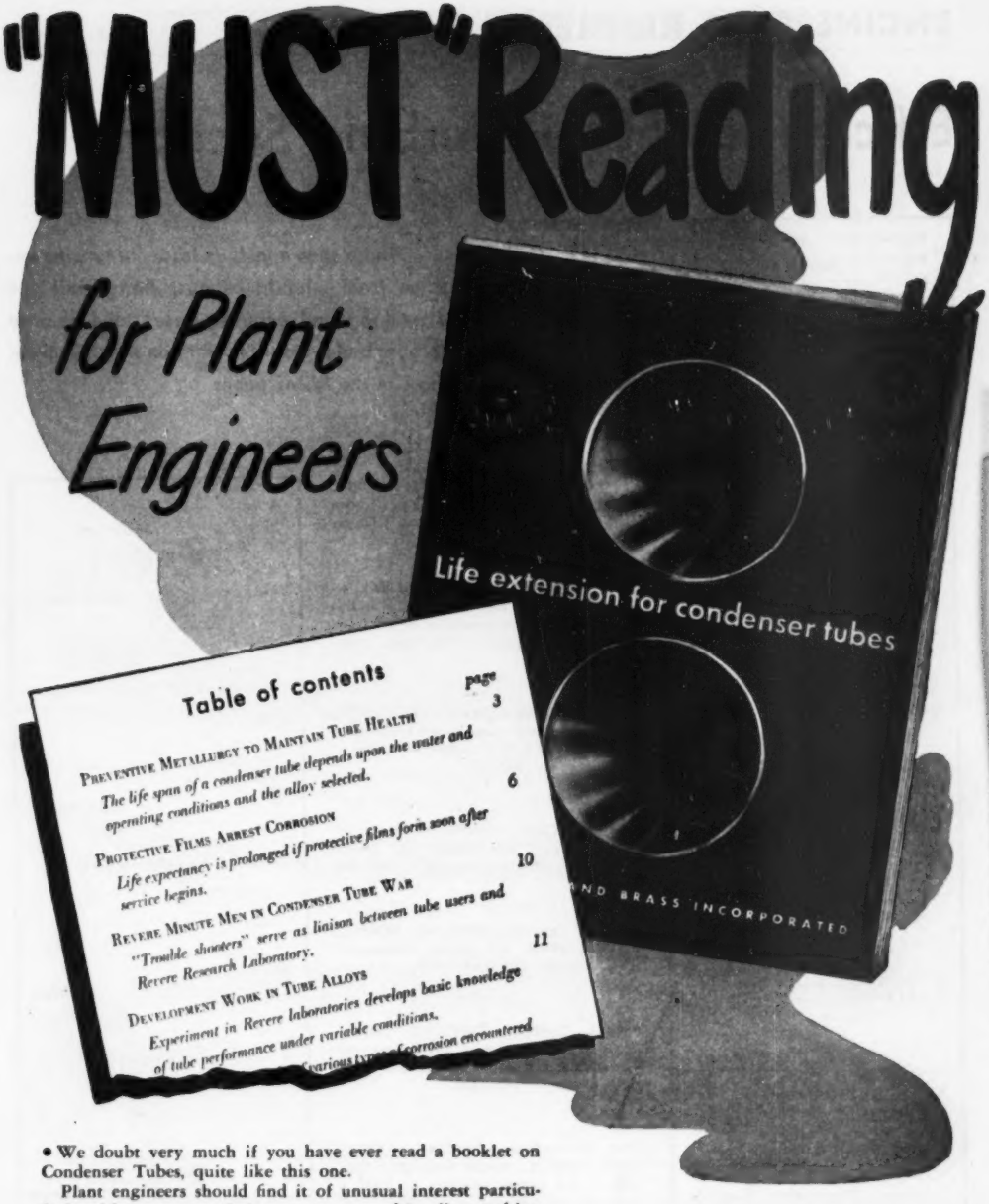
Increase Hardness and Life of Cutting Edges



Resurfacing leading edge of skip loader bucket using an oxyacetylene cast iron rod deposited with a dc arc and reverse polarity adds extreme hardness and longer life to the surface.

In addition, California Electric Power Co, Riverside, resurfaces working edge of bulldozer blades and some areas on auger cutting blades and pilots in this way. The surface becomes extremely hard, in fact it cannot be filed and can hardly be touched with a carborundum grinding wheel.

"MUST" Reading for Plant Engineers


Life extension for condenser tubes
Table of contents
page
PREVENTIVE METALLURGY TO MAINTAIN TUBE HEALTH
The life span of a condenser tube depends upon the water and operating conditions and the alloy selected. 3
PROTECTIVE FILMS ARREST CORROSION
Life expectancy is prolonged if protective films form soon after service begins. 6
REVERE MINUTE MEN IN CONDENSER TUBE WAR
"Trouble shooters" serve as liaison between tube users and Revere Research Laboratory. 10
DEVELOPMENT WORK IN TUBE ALLOYS
Experiment in Revere laboratories develops basic knowledge of tube performance under variable conditions. 11
ND BRASS INCORPORATED

• We doubt very much if you have ever read a booklet on Condenser Tubes, quite like this one.

Plant engineers should find it of unusual interest particularly with present restrictions on copper and its alloys making it more important than ever that every last ounce of use be squeezed out of the condenser tubes in their plants.

This 28-page booklet includes data on various copper alloys, photos of cut-away tube sections showing various types of corrosion encountered in condenser tube service and photomicrographs showing the grain structure of different kinds of metals under varying operating conditions.

Send for your copy today. Please make request on your firm's letterhead. Thank you. Address Department P.R., Revere Copper and Brass Incorporated, 230 Park Avenue, N. Y. 17, N. Y.

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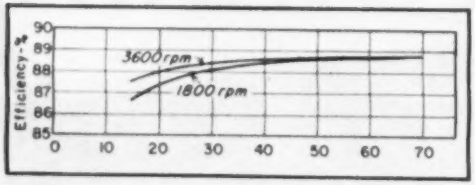
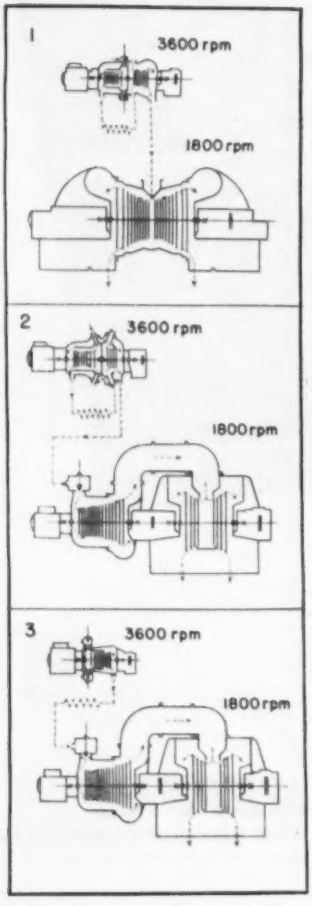
Efficiencies of L-P Turbine Sections



TURBINE EFFICIENCY is shown as a function of "equivalent nozzle area" (sq. in.) of low-pressure turbine section

Those shown include losses in turbine expansion from inlet to exhaust flange but not end packing and exhaust losses, and require superheat and pressure correction which is given in Fig 8 in the ASME paper



TYPE 1 — CROSS-COMPOUND TURBINE, 40–50% of load on 1800-rpm unit. L-P section efficency = 0.999 x curve value for 3600 rpm

TYPE 2—CROSS-COMPOUND TURBINE, reheat temperature over 1000 F. L-P section efficency = 0.999 x curve value for 3600 rpm. Reheat return pressure = 1.6 approx. crossover pressure

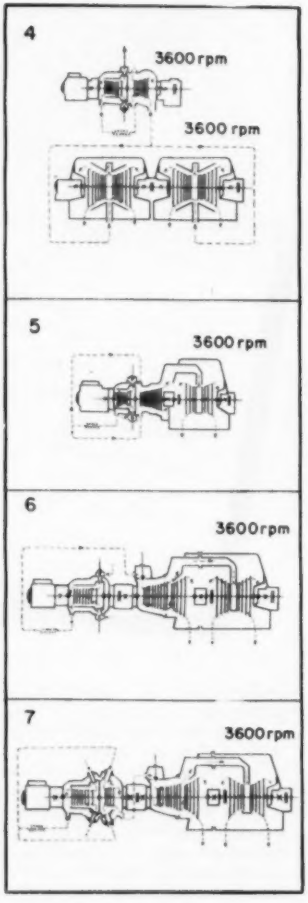
TYPE 3 — CROSS-COMPOUND TURBINE, crossover at reheat point. Reheat temperature not over 1000 F. L-P section efficiency = curve value for 1800 rpm.

TYPE 4 — CROSS-COMPOUND, 4-FLOW TURBINE, equal load division. L-P section efficiency = 0.996 x curve value for 3600 rpm

TYPE 5—TANDEM-COMPOUND, DOUBLE-FLOW TURBINE. L-P section efficency = curve value for 3600 rpm

TYPE 6—TANDEM-COMPOUND, TRIPLE-FLOW TURBINE. Reheat temperature not over 1000 F. L-P section efficiency = 0.998 x curve value for 3600 rpm

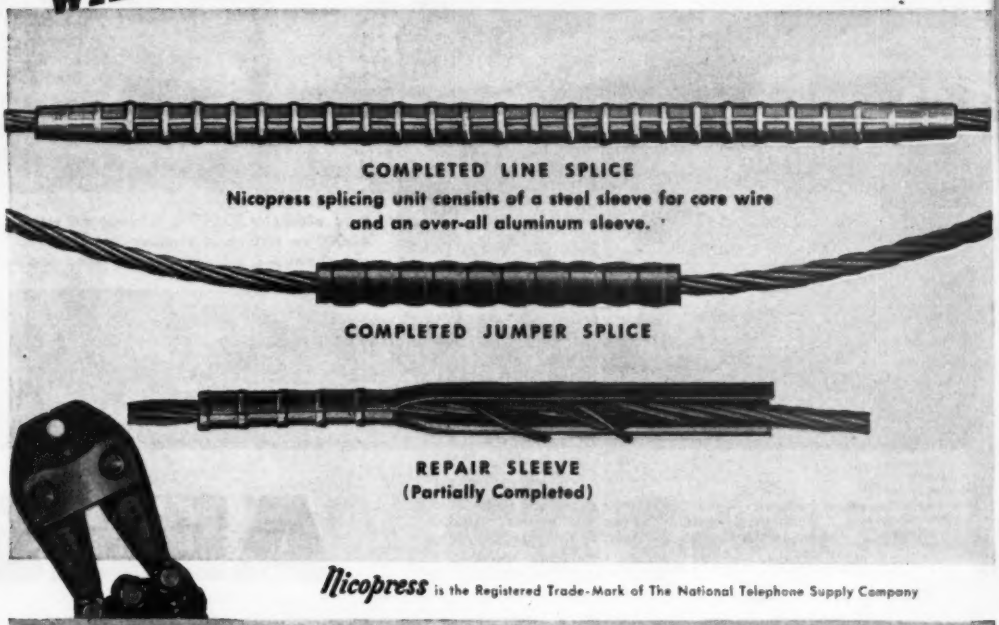
TYPE 7—TANDEM-COMPOUND, TRIPLE-FLOW TURBINE. Reheat temperature over 1000 F. L-P section efficiency = 0.997 x curve value for 3600 rpm



Adapted from a paper (No. 51-A-139) entitled "Comparative Efficiencies of Central Station Reheat and Non-reheat Steam Turbine-Generator Units" by C. W. Elston, Division Engineer, and P. H. Knowlton, Thermodynamic Engineer, Turbine Division, General Electric Co, before American Society of Mechanical Engineers, Atlantic City, N. J.

Nicopress SLEEVES for A·C·S·R·

WILL GIVE YOU PEAK PERFORMANCE!



COMPLETED LINE SPLICE

Nicopress splicing unit consists of a steel sleeve for core wire and an over-all aluminum sleeve.

COMPLETED JUMPER SPLICE

REPAIR SLEEVE
(Partially Completed)

Nicopress is the Registered Trade-Mark of The National Telephone Supply Company

The National Telephone Supply Company

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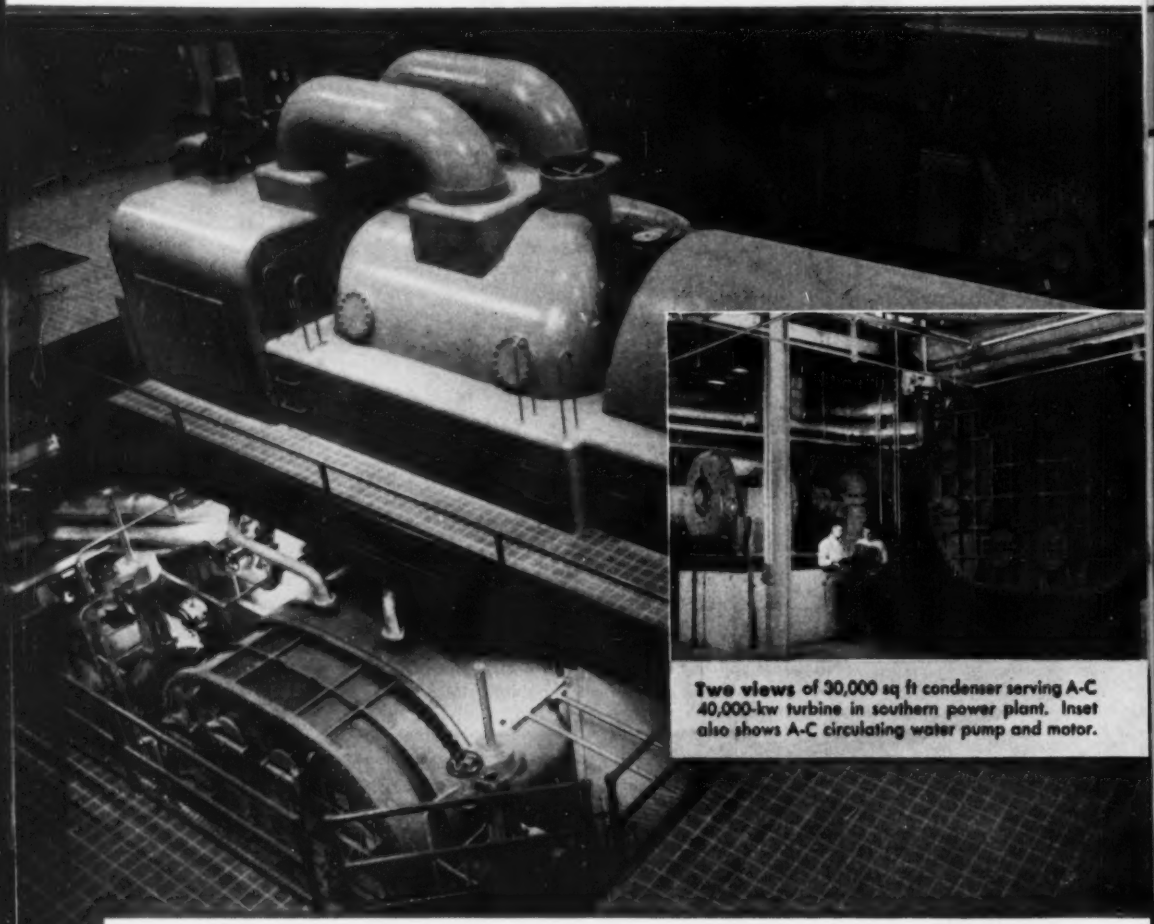
Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

THE NATIONAL TELEPHONE SUPPLY COMPANY

THE CONDENSER THAT CUTS



Two views of 30,000 sq ft condenser serving A-C 40,000-kw turbine in southern power plant. Inset also shows A-C circulating water pump and motor.

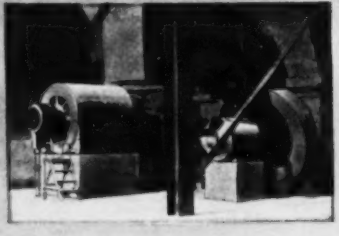
Equipment for Power: Water Conditioning equipment, chemicals and service . . . Steam and Hydraulic Turbines . . . Generators . . . Condensers . . . Steam Jet Air Ejectors . . . Power Plant Pumps and Motors . . . Transformers . . . Circuit Breakers . . . Switchboards and Control . . . Switchgear . . . Unit Substations . . . Utilization equipment.

ALLIS-

IT PAYS TO KEEP PACE WITH MACHINERY PROGRESS

Motors That Are at Home Outdoors

Open sky is roof enough for Allis-Chalmers *tube-type* totally-enclosed fan-cooled motors. Tube-type air-to-air heat exchanger construction makes large ratings practical. Time-proved design is practically self-cleaning, cuts maintenance costs.



POWER COSTS

3 WAYS

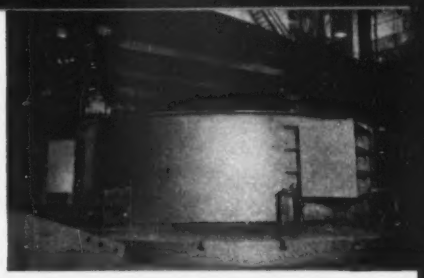
WITHOUT SURFACE CONDENSERS, low-cost steam-generated electric power would not exist. By maintaining a vacuum at the turbine exhaust, condensers increase plant efficiency and power output. By condensing steam for reuse, they minimize feedwater requirements and costs.

In installation after installation, Allis-Chalmers condensers have given outstanding performance. They are tailor-made for each particular installation. They incorporate design features that provide continuous unbroken operation. And they have consistently cut power costs by maintaining:

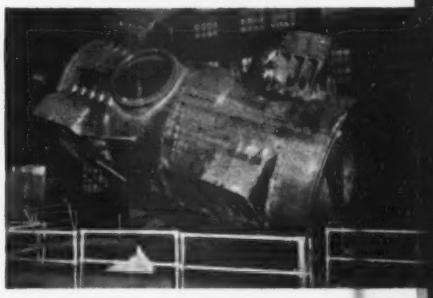
1. **Lowest practical absolute pressure obtainable with the water temperature available.**
2. **Highest "terminal-difference" efficiency; that is, the temperature of the cooling water leaving the system most nearly approaches the temperature of the steam in the condenser.**
3. **Highest possible condensate temperature.**

The engineering behind these cost-cutting, multi-steam-path condensers results from more than 60 years of condenser building experience. Since the days of the early steam engines, Allis-Chalmers has produced more than 13,000,000 sq ft of condenser capacity — for all areas of the country and for all types of water conditions.

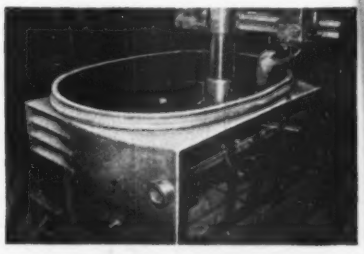
Whether you need a 500 sq ft or a 100,000 sq ft condenser, you can benefit from this experience — and from A-C's unexcelled manufacturing facilities. Why not discuss your requirements with your nearby A-C representative. Allis-Chalmers, Milwaukee 1, Wisconsin. A-3813



Adequate manufacturing facilities assure accurate machining and assembly. Here, a 40-ft mill easily handles end section of a 75,000 sq ft condenser.



Special welding positioner produces sound welds by permitting operator to work in natural position.



Drilling bolt holes in flange of large oval shell section requires modern facilities so parts will fit precisely.

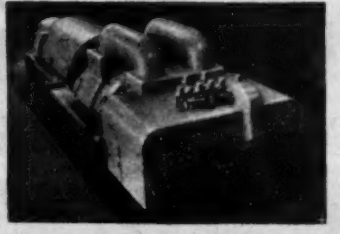
CHALMERS

A-C ALLIS-CHALMERS

Ask your A-C representative for Bulletin 1986784, which shows how Allis-Chalmers builds these cost-cutting condensers.

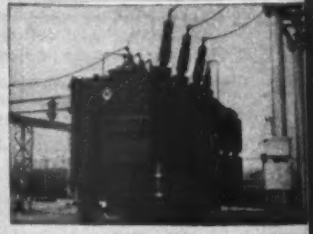
First Generator with Supercharged Cooling

In this operation-proved turbine-generator, *supercharged* hydrogen passes through rotor conductors. *Supercharging* increases output per unit size . . . cuts foundation costs, plant size, and breaker and bus structure requirements.



Transformers with Corona-free Design

To check insulation aging, A-C transformers are designed to be corona-free even at highest test voltages. Without corona, your transformers stay young; repeated voltage stresses do not cause progressive deterioration of insulation.



penta*
protected

WOOD pole designs carry the "high lines"

Wood pole structures protected with PENTA assure safe, dependable transmission for many years to come. PENTA provides this assurance by preventing rot, decay and insect damage – giving a clean, permanent protection.

PENTA can proudly point to a record of many years of very successful protection for poles and crossarms in every part of the country. PENTA also gains a vote of popularity from local officials who like the appearance of clean PENTA-treated poles along their roads and streets.

Build uninterrupted service, eliminate premature pole failures on your lines . . . specify poles and crossarms treated with PENTA, the *clean, sure* wood preservative!

THE DOW CHEMICAL COMPANY
Midland, Michigan
Dow Chemical Company, Limited, Toronto, Canada

protect poles with penta* the clean wood preservative

The Dow Chemical Company
Dept. PE 19 • Midland, Michigan

- ☐ Send me free booklet, "Pointers on Penta."
- ☐ Send me list of PENTA treating plants.
- ☐ Please have technical representative call.

Name _____ Title _____

Company _____

Address _____

City _____ State _____

DOW
penta
CHLOROPHENOL

Recast Generator Slip Rings Save Time and Labor

Phosphor-bronze slip rings recast from salvaged brass are saving Puget Sound Power & Light Co thousands of dollars in time and labor. In addition to supplying slip rings for Snoqualmie Falls generators built in 1898, recasting provides bronze bearings and bushings from old brass nozzle tips and needles, brass chips, and broken brass valves.

The scheme became most economical with the advent of a split-type slip ring cast in halves each weighing 89 lb. With this design new rings could be installed during an overnight outage. With stock slip rings the generator would have to be stripped down to the shaft and new insulation provided, a process requiring up to 1½ months.

Salvaged brass is melted down in an old forge fired by stove oil and compressed air, with borax added to inhibit loss of vapors. The forge heats a 90-lb melt in 40 min. Bronze castings are machined in a lathe as matching pairs to form a ring. They are fitted over the existing slip ring after it has been machined to a perfect round.

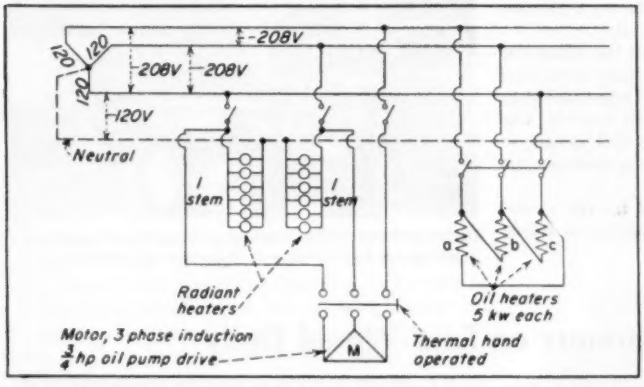
Old slip rings are machined in place by spinning the generator at reduced speed and using a jig with a cutting tool and cross feed. Grooves are cut at the two corners of the ring face to receive matching flanges cut on the inside of the new rings.

New rings are installed by compressing the split ring with two turns of a cable tightened with a turnbuckle. Holes are drilled and tapped through the old and new rings to receive counter-sunk phosphorous bronze screws. To complete the operation screw heads are machined flush with the new ring.

During a two-year test on one generator, the fabricated slip rings have not produced any ripples or irregular wear.

BRONZE CASTINGS for slip ring are made from brass nozzle tips, chips and old valves in forge fired with stove oil

Prevent Spillgate Freezing in New England Winter



HEATER AND PUMP CONTROL schematic diagram for one cubicle showing control of oil and radiant heaters, and control of induction motor oil pump

OIL PUMP AND IMMERSION HEATERS in cubicle, with oil thermostat in first heater

J. L. HYLAND and **A. L. DAVIS**
Western Mass. Elec Co, Springfield, Mass.

Freezing of the 10 spillgates at the Cabot station of Western Massachusetts Electric Co is successfully prevented by hot oil circulation and use of radiant heaters under automatic temperature control, with a connected heating load of 119 kw.

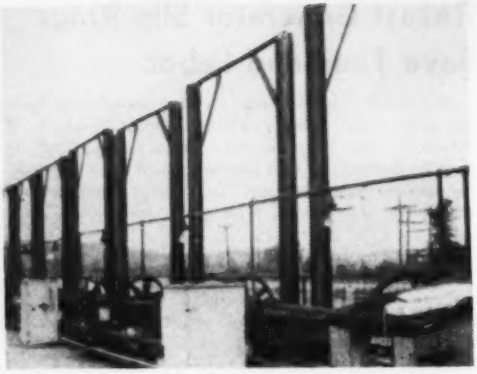
This 51,000-kw plant located on the Connecticut River is of major importance to the system, and it is essential that the spill gates can be opened at any time, especially to prevent flooding of the canal and surrounding property during periods of high water and regardless of the season of year.

Gates are drop type, weigh 6 tons each, and are 14 ft

high x 13 ft 9 in wide. Five cubicles serve these gates in pairs. Each cubicle contains three 5-kw, 220-v immersion heaters connected 3-phase to 208-v supply. A 10 gpm oil circulating pump, with a 2.5-gal expansion tank, is connected at the cubicle with 114 ft of 1.5 in. dia black iron pipe (57 ft per gate). Used transformer oil is heated and pumped through this piping from the cubicle to the pair of gates served by it. The pipe is welded to the structural channel iron gate frame and was installed at a time when repairs were being made to the concrete piers at the dam. An ambient controlled switch cuts radiant and immersion heaters into service at 33 F and shuts them off at 35 F. At 120 F a hot oil thermostat also opens the heater circuit.

Gate stems are 8-in I-beams attached to the pond site of the gate and extend to 20 ft above the gate top. Each stem is served by a radiant heater of five 250-w lamps, and this heats the stem at about water level so that the temperature of the metal at this point is always above freezing.

A 40-hp induction motor drives the gate mechanism through a shaft equipped with clutches. Normally three or four gates are raised at a time. Head on the plant is 60 ft. Steam line service was originally used to prevent gate freezing. In a typical 100 winter days (average 34 F high and 13 F low) 88,000 kwhr were used in thawing. Energy cost at 5 mills per kwhr was $4.40 per day in this period. Hard glass type of infrared lamps is used to minimize breakage.



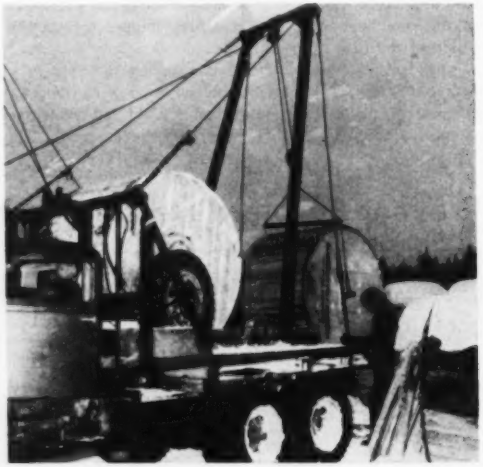
DAM SPILLGATES and control cubicles for oil heaters and pump

Two Men Load Reels With A-Frame

A simple truck-mounted A-frame hinged at the base enabled two men to load in the storage yard and unload in the field standard reels of transmission conductor used on Washington Water Power's Cabinet Gorge transmission line. The frame is mounted about midway of the truck bed, with lines fore and aft which permit it to be tilted either way. A winch line from the front of the truck provides the power needed to lift and move the reels.

To load, the frame is tilted back, and the lifting line attached to the reel. When the reel is hoisted to the level of the truck bed it is swung forward and rolled into place against the cab. The second reel is loaded similarly. Unloading requires that the frame be tilted back farther, so that the reel will be pulled back, then swung down over the rear of the truck bed.

Use of the frame eliminates the need for any special cranes or cribbing, as well as extra manpower in getting conductor from storage yard to jobsite.



SIMPLE A-FRAME used by Washington Water Power two-man crew in loading and transporting reels of transmission conductor

Carry Poles or Transformers on Four-Wheel Dolly

Replacing poles and transformers at property-line locations becomes a simple job with a four-wheel dolly used by Southern California Edison Co. Poles up to 70 ft long and transformers up to 50 kva can be carried from the truck to the site through any clearance not less than 30 in. wide by a five-man crew. Large tires on the device prevent damage to lawns and walks.

The dolly breaks down into four sections—front wheels and T-handle; cradle (rear wheels); pole-pillar and saddle; and tongue—for convenient transportation in the back of a pick-up truck. Although the dolly weighs only 260 lb fully assembled, it can carry up to three tons. This is the limit set by the wheel and tire manufacturers as the aggregate total weight for the device.

The various sections assemble and disassemble with ease but can be locked in operating position to prevent accidental disassembly. For handling transformers up to 37½ kva the cradle and tongue sections are used. In this stage of assembly the dolly weighs only 118 lb.

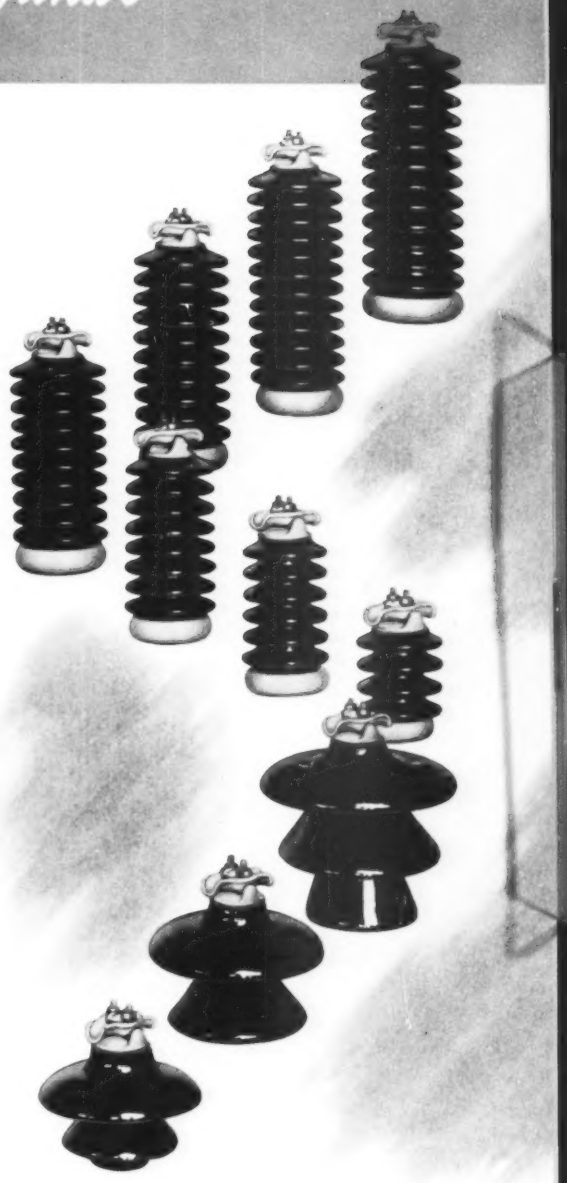
For transformers up to 50 kva the front wheels and T-handle section, weighing 82 lb, is attached after the trans-

(*Continued on page* 133)

HI-TENSION NEWS *Junior*

Now...There's an O-B Clamptop

- **For Any Voltage 22 to 69 KV**
- **For Conductor ¼ Inch to 1½ Inch**
- **For Pintype or Line Post**



Now you can have the modern successor to the tie wire - - the O-B Clamptop - - for any voltage from 22 to 69 kv, and any size conductor cable from ¼ inch to 1½ inch, either in the conventional pintype design or the line post. Voltage, conductor diameter, or insulator style, are all now fully accommodated in the Clamptop category.

With Clamptops, loose connections at the insulator head, slipping conductors and strand chafing are ended. A man without special skill, using a common hand wrench, can make up the "tie" in considerably less than a minute, and make it better, stronger, and more lasting than the best-installed long-wire hand tie. If lines must be worked with hot tools, the Clamptop is outstanding in its simplicity, speed of handling, and much greater safety.

If you feel that the established pintype insulator design - - regular or post - - can't be improved upon, you haven't investigated the Clamptop. It's simple to handle, saves valuable time, and produces a better job at each point of support - - and it is now available for free choice in the complete 22-69-kv range. By substituting a secure clamped connection for an insecure tie wire, you gain a long list of practical advantages. Specify O-B Clamptops on your next line project and see for yourself.

Ohio Brass

MANSFIELD, OHIO, U.S.A.

HI-TENSION NEWS *Junior*

When You Figure Years Per Dollar

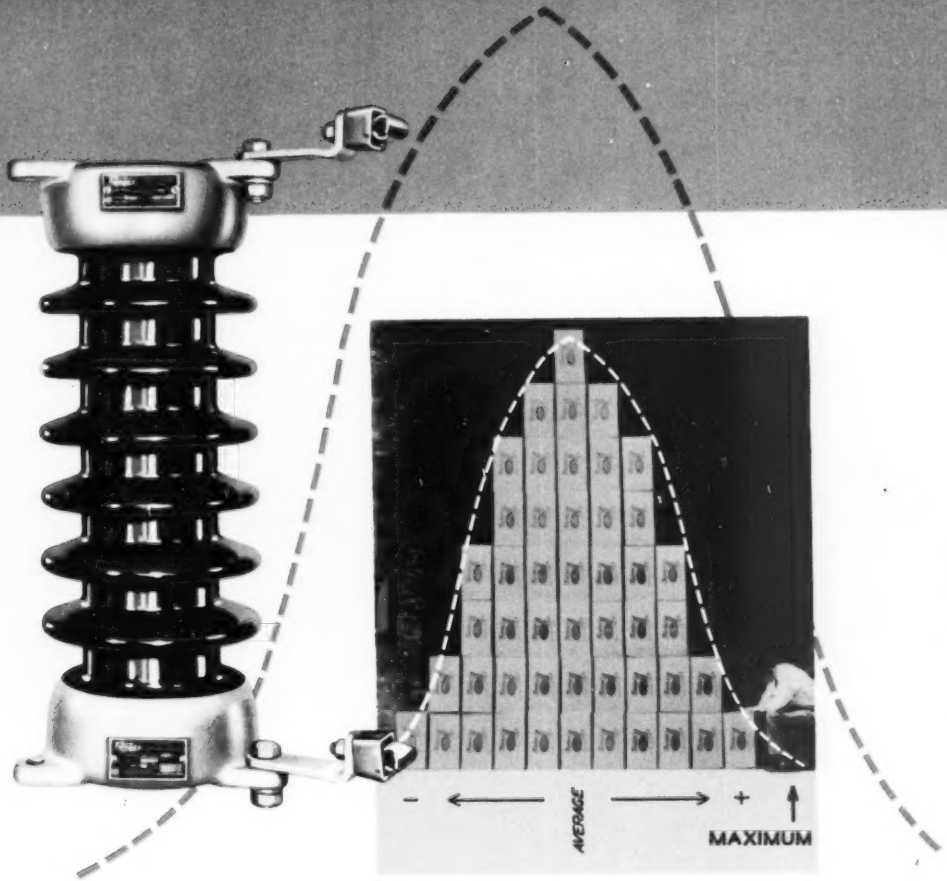
. . . here's a real bargain!

● If you ask, "Will this station insulator fit my system standards?", the answer is easily found, as the industry closely defines measurable factors.

If, however, you were to ask, "How long will this station insulator give satisfactory service?", there is no simple answer - - at least not until those years have passed.

Be sure to distinguish between what *can* and what *can't* be measured when you buy station insulators. Likewise be sure to recognize that *time* actually determines your real money's worth. And, years of performance can't be covered in a specification.

Most O-B station insulators are bought on repeat order, today, by men who have *had* their chance to gauge their money's worth. For a genuine bargain, figured in years per dollar, equip your stations with O-B.



MAXIMUM VALUES

. . . . An Arrester Rating You Can Trust!

Assume a large group of lightning arresters that have passed factory inspection and are ready for shipment. Possibly one *just passed* - - that would be normal expectation - - and all the rest are better. But, you use these arresters one-at-a-time. Is the one you are looking at the poorest, the best, or the average of the group? It would be well to know this, especially if the spread of performance is wide, before trusting it to protect a valuable transformer.

You have no answer to the question if your arrester is rated in terms of average performance. Average values don't imply that you will get an average specimen - - in fact they admit considerable departure from what you *think* you may have.

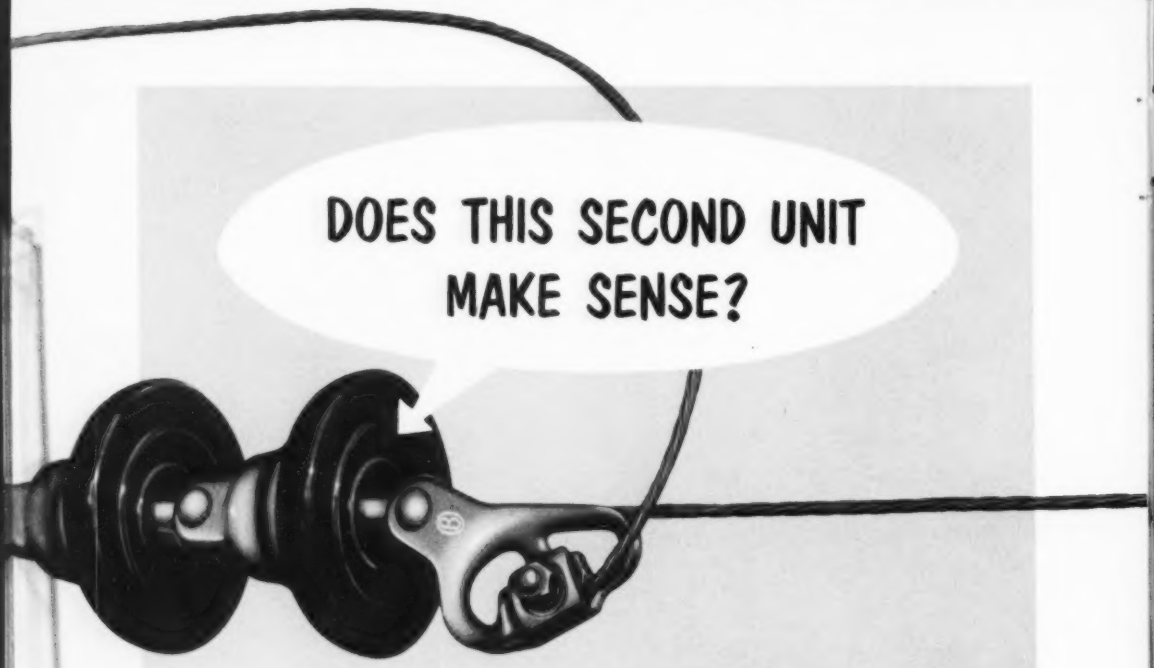
When you buy an O-B Thorex arrester, however, its rating is realistic - - in fact it is pessimistic! We rate *just one* unit. This is the poorest that will pass inspection. O-B arrester ratings state MAXIMUM values, not average. Every single Thorex arrester is as good or better than listed. Obviously, practically all are better. And even the MAXIMUM Thorex arrester is the biggest dollar's worth of protection that you can get.

When you put a lightning arrester to work, *know* what it will do. This means buying an O-B Thorex - - the only arrester sold under MAXIMUM ratings.

Ohio Brass

MANSFIELD, OHIO, U.S.A.

HI-TENSION NEWS *Junior*



DOES THIS SECOND UNIT MAKE SENSE?

Let's say you build a primary distribution deadend at 4,000 volts, figuring at least 15 years' life, and using a single 6-inch suspension unit. Urban residential power consumption has increased 3½ times in only 13 years, and the rate of increase is quickening. Will 4,000 volts do the job, not in fifteen years, but perhaps five years? If voltage goes up, a second insulator unit must be added to the deadend. Is it wise to build that deadend twice when once would have finished the job?

What does it cost in time to rebuild this deadend, probably hot? What is involved in getting rid of an extra five inches of sag imposed by the second unit? Will these costs look good compared to a couple of extra dollars spent originally? That's all we're talking about.

In other words—at the time of original construction does this second insulator unit make sense?

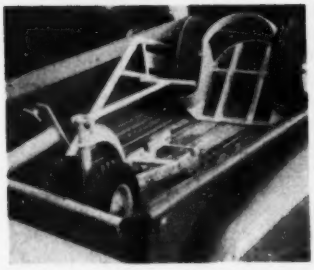
Ohio Brass

MANSFIELD, OHIO, U.S.A.

4229-H

4-Wheel Dolly

(*Continued from page 128*)



VERSATILE DOLLY carries three tons over lawns (top). For transformers up to 37½ kva (center), dolly disassembles into two-wheel rig. Dolly breaks down into four sections (bottom) for easy transportation

former has been lifted from the ground. The dolly then is pulled along by the T-handle. To carry poles the pole-pillar is attached to the cradle. This section weighs only 40 lb.

Improving Grip on Switch Stick Handles

To avoid hand slippage, especially in wet weather, an eastern utility uses micarta rings. Three of the rings, ¾ in wide and ⅛ in thick, are placed 18

BERMICO®

THE CONDUIT THAT SAYS

"STOP!"

To LEAKY JOINTS: Bermico's joints fit tight. No joining compound is necessary. It makes a water-tight joint.

To ACIDS: Bermico is highly resistant to all types of soil acids and alkalies.

To SHOCK: Bermico Conduit is engineered to take the shocks and stresses of transport—the heavy loads imposed during installation.

To ABRASION: Bermico's smooth inside bore assures quick and easy cable "pull through" without danger of abrasion.

To SLOW DOWNS: Bermico's convenient 8-foot lengths are light in weight, easy to handle. Cutting and tooling can be done quickly, right on the job. All joints are precision milled for speedy installation. Bermico's complete line of bends, plus 5° angle couplings, enables you to overcome unusual field conditions without delay.

For fast installation and dependable protection specify Bermico.

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SOLKA & CELLATE PULPS • SOLKA-FLOC • NIBROC PAPERS
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Today's modern Wood Preserving Plants know how to protect poles with creosote and leave them dry and "clean." Specifications for clean treatment, when combined with proper specifications for the creosote used, provide "complaint-free" poles.

One of the largest producers of pressure-creosoted poles reported to us: "We haven't had a single complaint about the cleanliness of the last million yellow pine poles treated with creosote."

For poles that are *clean*—for poles that *will last*—specify "dry pressure-creosoted poles."

KOPPERS COMPANY, INC., PITTSBURGH 19, PA.
Tar Products Division

You can count on Koppers for Creosote!

KOPPERS
All Standard Specifications
Creosote
The Performance-Proved Wood Preservative

in. apart at the handle end of the stick. The rings are attached to the stick by ⅜-in micarta pins. Thus three definite ridges are formed, over which the operator's hands cannot slip. Rings and pins are obtained from the manufacturer of the insulated switch stick heads.

Field experience showed the rings ⅛-in thick suffered some breakage. Rings ¼-in thick were found to solve this difficulty.

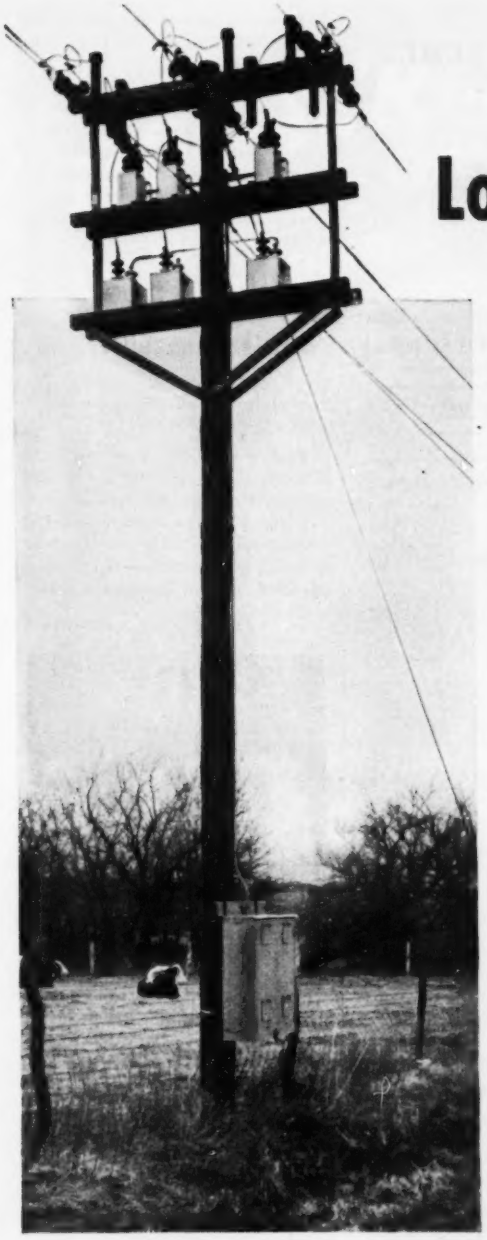
Salvage Copper Scrap Without Making Smoke

The problem of salvaging copper scrap, which sells for 6-7 cents more per lb with insulation removed, and complying with the Air Pollution Control requirements, has been solved by the Los Angeles Department of Water and Power. Their $66,000 incinerator, of their own design, does the job of burning off the insulation at 1,200 F, which is top limit for maintaining the scrap value. It also has a separate chamber for rubbish disposal and an afterburner chamber, with gas burners that maintain 1600 F to consume the smoke.

The copper burning chamber, 8 x 9 x 8 ft, is loaded by a fork lift truck which feeds the scrap on a 5 x 8 ft steel pallet, on a steel rail car. After 30 minutes burning, the car and pallet are withdrawn by the truck, the scrap is cooled by streams of water which also wash it, and the scrap is loosely formed into 1500 lb bails by a bailing machine, for higher price sales. Loose bailing requires less expensive bailing equipment and is preferred by the scrap dealers.

The rubbish chamber, 8 x 8 x 9 ft, follows the first chamber and is mechanically loaded by a skip hoist, similar to a concrete mixer. This hoist is hydraulically operated, with a door interlock for further safety. Pieces of rubbish too large for the hoist can be hand-charged into the chamber. Previous to the incinerator's construction, the Department paid $130 per month for rubbish and ash removal. This saving is offset by the slightly greater gas consumption in the afterburner chamber, due to the increased smoke from certain types of lumber.

The afterburner chamber, separated from the rubbish chamber by a series of baffles, is electrically operated and thermostatically controlled. This



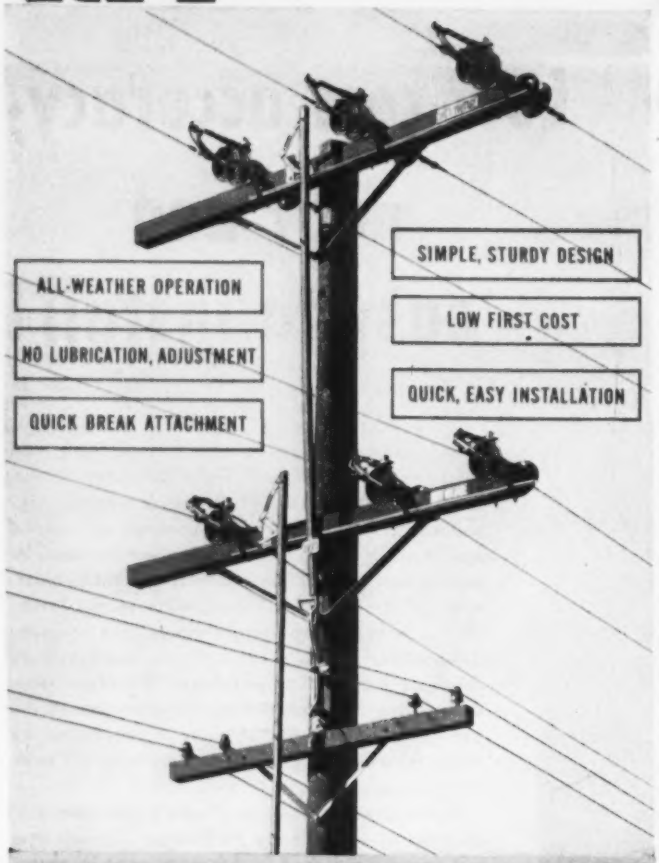
Low-cost accuracy; neat and easy to install!

Low installation costs and strict accuracy have been linked together in Westinghouse Instrument Transformers for years. Basic construction features like top-mounted HV bushings simplify connections . . . make neat installations. Here, time and effort are saved by bolting the Current Transformers to the middle cross-arm and the Potential Transformers to the lower. Wiring is practically straight through. In addition, design features, like vacuum plastic impregnation, eliminate maintenance problems. The Midwestern utility using these transformers bought them on the basis of *low initial cost* and *ease of installation.* Its Meter Superintendent reports that metering has been "most accurate."

Westinghouse Instrument Transformers offer you the most complete line in the Industry . . . each type and rating is designed for a specific need in metering or relaying applications. Your Westinghouse representative will help you select the right Instrument Transformer for your problem. Or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70652

YOU CAN BE SURE...IF IT'S
Westinghouse
INSTRUMENT TRANSFORMERS

KPF POLE TOP SWITCHES



MORE SWITCH FOR LESS MONEY

KPF Pole Top Switches cost less to buy and give longer service because they are simplest in design, sturdily built. They need no separate deadends, no "extra" insulators. Simple "3-step" installation saves man hours—(just bore holes in cross-arms, tighten bolts, attach connectors). Insulator stacks easily adjusted for line sag. Free-floating, self-aligning, silver-surfaced blades always maintain proper contact. Vertical, horizontal or triangular mounting. Write today for Catalog, details of KPF switches.

2804

KPF ELECTRIC COMPANY
1624 E. Alpine Avenue • Stockton 5, Calif.

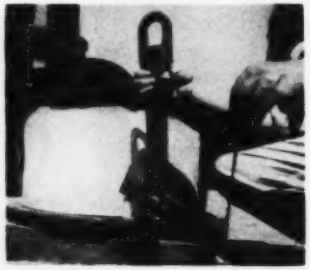
chamber consumes the smoke completely before passing the gases to the 60 ft stack.

The incinerator unit disposes of 15-25 tons of rubbish and processes 45 tons of scrap each month, with a capacity of 500 lb of insulated wire every 30 minutes. In addition, the copper processing chamber is used to anneal bare copper ground and the wires.

Pick Up Reels With Folding Lifter

A. J. SCOTT, General Store Keeper, California Electric Power Co, Riverside, Calif.

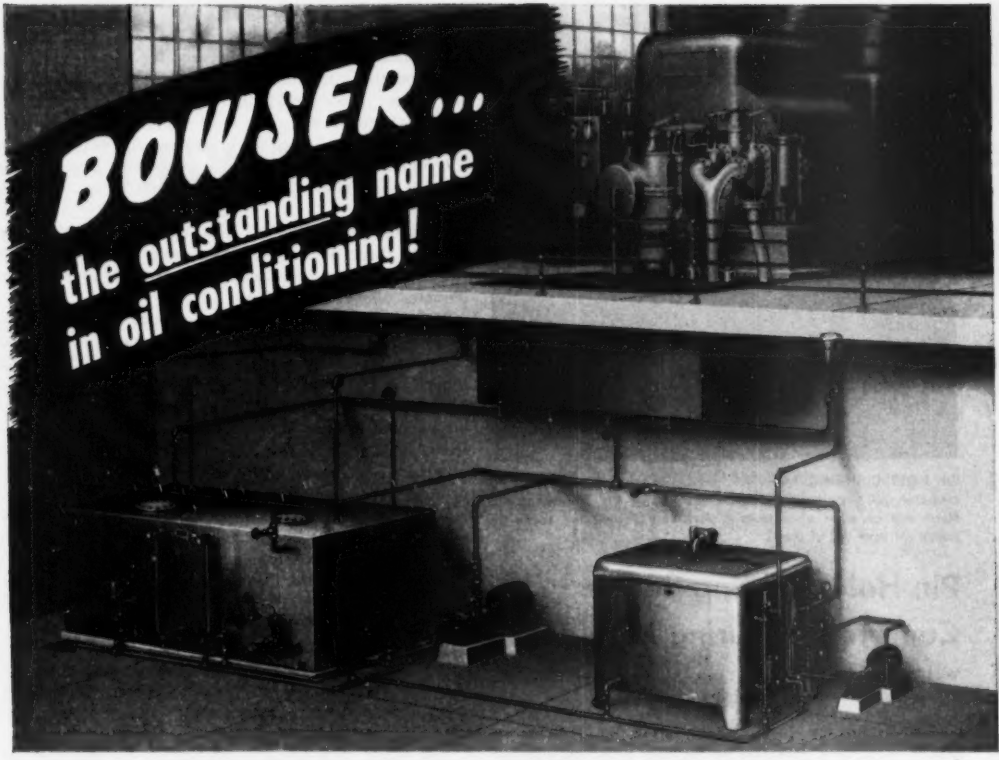
Folding reel lifter allows operators in California Electric Power Co's reel yard to lift easily and safely loaded reels stored flat one on the other. The device, which can lift reels weighing up to 2,000 lb, eliminates old practice of snaking a cable through and underneath reel.



REEL LIFTER is used to pick up reels which are stored flat. Device has one-ton capacity

In operation lifter is folded and placed in reel. Arm is allowed to drop and engage against top flange of reel. To remove lifter, arm is pulled into shank and device removed. Lifter consists of shank made from two steel straps of ¼ x 1½-in. stock and folding arm of ⅜ x 2-in. stock. Arm is attached to shank by rivet and cotter key at point off-center so that it will tip down more readily. It is pulled into shank by a light chain.

Steel dogs between straps prevent arm from moving too far into shank when lifter is being retrieved. Otherwise it would bind against reel and be difficult to remove. Eye is made from ⅜ x 3 x 5-in. steel through which is drilled a hole large enough to fit over cable hook.



for power generating equipment...!

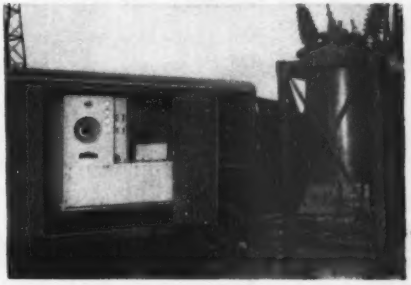
This Bowser turbine oil conditioning system keeps oil "bone dry" and crystal-clear . . . the best "stay-on-the-job" insurance a turbine bearing can have. Costly bearing failures are avoided and less stand-by equipment is required with Bowser oil conditioners. Turbine oil lasts for years, too! That's why Bowser oil conditioners are on the job in a majority of power generating plants.

●

FOR INSULATING OILS...

The Bowser Hydro-Volifier is a conditioning unit for transformer, circuit breaker and switch oils. It restores oil dielectric to 35 k.v. in a single pass while the equipment remains energized . . . no service interruptions with Bowser oil conditioning!

MAY WE SEND YOU COMPLETE DATA?



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BOWSER

REGIONAL OFFICES: Atlanta • Chicago • Cleveland • Dallas • Kansas City • New York • San Francisco • Washington, D. C. • Canadian Plant and Sales, Hamilton, Ont.

PIN-HOLE LIGHTING from eight projection fixtures provides 8-in. diameter spot illumination for each conferee at the 16-place table. Notes can be made when room is dark and pictures are shown on screen (at near end of room)

Pin-Hole Lighting Serves Conference During Movies

WALTER S. GREENWOOD, Lighting Representative, Public Service Electric & Gas Co, Newark, N. J.

Illumination for taking notes during the showing of motion pictures is provided by pin-hole downlights in the new Works Simplification Conference Room at the Radio Corporation of America, Tube Dept. in Harrison, N. J.

Sufficient illumination was desired for making notes but not enough to interfere with the showing of the pictures on the screen. After considering the seeing tasks involved, it was determined that the most comfortable conditions would be obtained when the brightness of a white paper at the note-taking position was approximately equal to the average brightness of the projected pictures appearing on the screen.

A partial false ceiling, or shelf, approximately the same size and shape of the conference table was suspended in the center of the room and the lighting equipment was mounted above this ceiling.

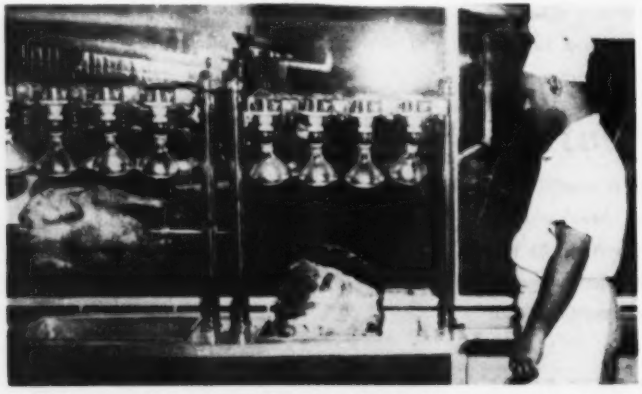
Eight lighting fixtures, each equipped with a 100-w, T-8, 20-v, contour map projection lamp, were installed above the false ceiling. Each downlight unit was arranged to provide illumination for two positions on the conference table. This was accomplished by drilling a hole in two of the four framing shutters that are used in each projection light fixture. The hole which is 0.081 in. diameter produces a circle of illumination approximately 8 in. diameter on the table. By adjusting the shutters the spots may be located at the desired working position on the table. Brightness readings showed that the brightness of a white paper under a spotlight on the conference table was 13.4 footlamberts and the average brightness of the motion picture screen was approximate 10 footlamberts during the showing of the film.

General illumination is provided by 22 75-w, R-30 reflector flood lamps, mounted on adjustable sockets so that the light is directed outward toward the walls and ceiling. An illumination of approximately 11 ft-c is provided on the conference table.

The green chalk-board is illuminated by two recessed adjustable spot lighting units, each equipped with a 150-w, side prong, PAR 38, projector spot lamp.

Infrared Roasting Attracts Customers, Increases Profits

T. R. WARREN, Kansas City Power & Light Co, Kansas City, Mo.



TURKEYS are roasted in five hours and pre-cooked hams in 2½ hours on turning spit under infrared lamps. Taste buds are stimulated as customers watch through show window

Infrared roasting of turkeys, hams, and other meats has boosted business in Fred Wachter's Kansas City restaurant by 51%. Roasting is done in the window while facinated customers look on. Shrinkages have been cut in half. Much juicier meat is available after cooking, which eliminates hard unusable crusts on roasts.

Power costs are moderate. A precooked 20 to 25-pound ham can be cooked in 2½ hours. A 30-lb turkey can be cooked in 5 hours, and a roast of 60 to 70 lb, a whole round, takes 12 hours. The owner reports that operating cost of the entire infrared "oven" is justified by reduction in shrinkage of meat alone.

Since the installation was first made several improvements have been developed. Separate switches have been installed for each lamp so that the ones not in use can be turned off. Each lamp has been put on a swivel bracket so the lights may be pointed directly at the portion of the meat to be cooked. All lamps have been placed

FINEST DISTRIBUTION PINTYPES EVER MADE

THANKS TO VICTOR PURIFIED PORCELAIN!

There are many reasons why power men are partial to Victor Pintype insulators . . . but the biggest is that they're made of VICTOR *PURIFIED* PORCELAIN— finest insulator porcelain ever made! *PURIFIED* PORCELAIN gives these pintypes a strength and resistance to impact that are unequalled. Puncture values are higher. Uniformity, hardness, density and durability are greater than ever before!

AND, remember, every Victor Pintype is electrically tested before shipment.

***The result*—dependability under *all* service conditions!**

VICTOR INSULATORS, INC., VICTOR, N. Y.

VICTOR NO. 5
DISTRIBUTION PINTYPE

ADVANCE DESIGN FOR ALUMINUM CONDUCTORS

For the larger aluminum conductors being used today, Victor has increased wire groove sizes on distribution pintypes. For complete engineering data, write today for Bulletin No. 4.

Specify
VICTOR
PINTYPE INSULATORS

on a movable bar that can be raised or lowered. Standard 250-w industrial lamps are used and some red lamps are mixed with the clear lamps to cut down glare. Turkeys, hams, and other meats to be roasted are placed on a revolving spit. Research is continuing with a view to developing the infrared technique for preparing breakfasts and baking.

Farm Power Costs Revealed in Survey

An unusual report on the operating costs of various pieces of farm electrical equipment over a year's span has been prepared by the Consumers Power Co, Jackson, Mich. The four-page illustrated story was the outgrowth of a survey undertaken jointly by Consumers Power Farm Service Advisor, Ray L. Conant, and County Agent Abram P. Snyder.

Guinea pigs for the study were the farm buildings owned by Gerritt Hesselink of Osceola County, which used an average of 1,398 kwhrs per month. Average cost was $24.84 per month. It broke down as follows:

1. House lighting, including all small appliances—$2.58
2. Refrigerator—$.49
3. Electric range for 90 meals a month for a family of six—$2.42
4. Home freezer—$2.38
5. Water pump for household and barn use—$1.42
6. Barn lights, including service to root cellar, calf house and granary—$1.98
7. Milk separator for one 10-gallon can daily—$.04
8. Milking machine operating on a herd of 25 cows—$.53
9. Gutter cleaner—$.23
10. Milk cooler—$5.29
11. Water heater (12-gallon) for washing milker, dairy utensils—$4.06
12. General water heater—$3.42

Ranges, Heaters Pushed By Seattle City Light

Credit of $55 toward installation of an electric range and electric water heater is being allowed residential customers of Seattle City Light under a new wiring campaign announced by P. C. Spowart, assistant City Light superintendent.

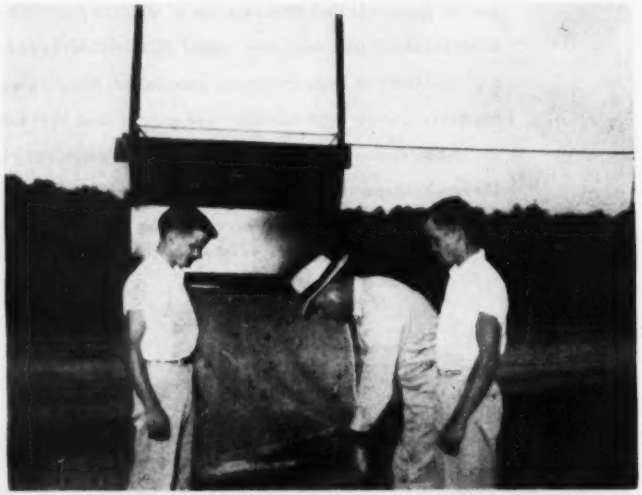
Allowance of $30 is being given for wiring a range, and $25 for a water heater, which must be of 50-gal size or larger. In addition, $25 is being credited to customers using "side-arm" heaters, if they trade them in on an automatic heater. The offer does not apply to new construction.

Of City Light's 179,000 residential consumers, 149,000 have electric ranges. More than 5,000 took advantage of a similar offer in 1950-51.

Ballasts Designed for Rapid-Start F-Lamps

New 40-watt fluorescent lighting ballasts, designed for use with General Electric Co's recently-developed Rapid-Start lamps or their equivalent, have been announced by the company's Specialty Transformer and Ballast Department. They provide rapid lamp starting without external starters and give lamp life equal to conventional switch-start circuits, according to GE engineers who worked on their development.

They say that the new units are smaller, lighter, and less expensive than conventional instant-start 40-watt ballasts and provide lower watts loss, quieter operation and longer lamp life. The lamp-ballast combination will offer high-PF instantaneous two-lamp 40-watt operation at a cost comparable to the high-PF external switch-start combinations that are now being used.



HAWK MOTHS and other night-flying insects caught by the "black light" are scooped out of a plastic bag by Dan Hagan, a Statesboro, Ga., tobacco farmer, as his twin sons watch

Lights Out for Insects

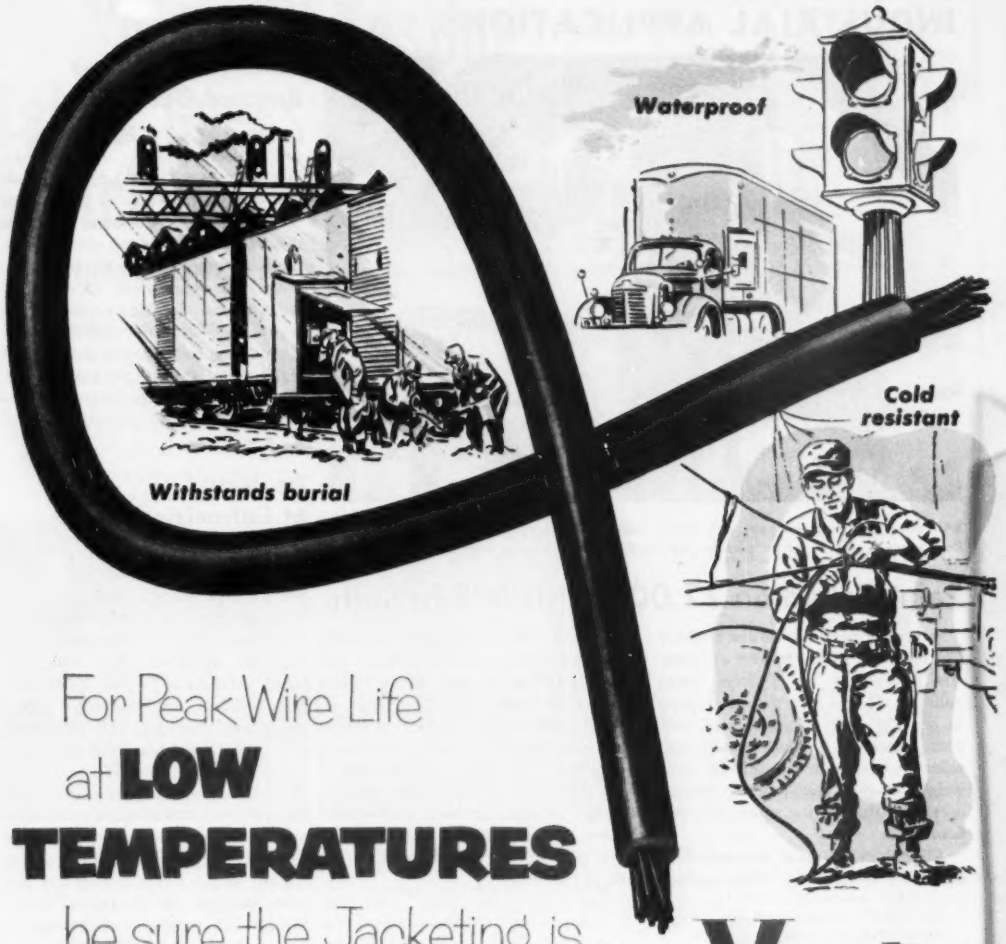
New insect control light is meeting with great success in Georgia where installations have been made on test farms by Georgia Power Co.

The traps use "black light"—fluorescent materials that glow under ultra violet radiation. Two 36-in., 30-w black light lamps are used.

Georgia Power Co purchased four of the units last year and located them on farms near Tifton Experiment Station. Under supervision of station personnel, the traps reduced insect damage to tobacco crops which suffer heavily from the hawk moth, producer of destructive horn worms.

Traps were mounted on relatively high ground to cover the widest possible area. Crops as far away as half a mile were virtually free of infestation. Insect damage was then .5% in the immediate area of the traps. Proof was so impressive, in fact, that nine farmers bought similar units from the Gardner Manufacturing Co, Horicon, Wis.

Testing is still going on for control of boll weevil, the cotton killer, and of the mole cricket which destroys roots of pasture grass.



For Peak Wire Life at **LOW TEMPERATURES** be sure the Jacketing is...

Control cables with a new lease on life! That's what you get when they're jacketed with VINYLITE Brand Plastic over cores of polyethylene. Here are the reasons:

• Specially formulated VINYLITE Plastic compounds stay flexible and easy to handle and retain their excellent electrical characteristics right down to –67 deg. F. • They are virtually good as new after long submersion under the water or burial under the ground. • They strongly resist greases, oils, alkalies, most strong acids, salt air, brine, and abrasion.

You can see why they are unmatched in excellence for municipal signal systems, chemical plants, on railroads, in power stations, and a host of other tough installations.

VINYLITE Plastics and polyethylene permit smaller overall cable diameters. They strip and splice easily, speed work of installing. Whether your control cable and wire needs are for military or civilian equipment, you will get better service from VINYLITE Jacketing Plastics over polyethylene. Write for a list of representative suppliers. Address Dept. NK-28

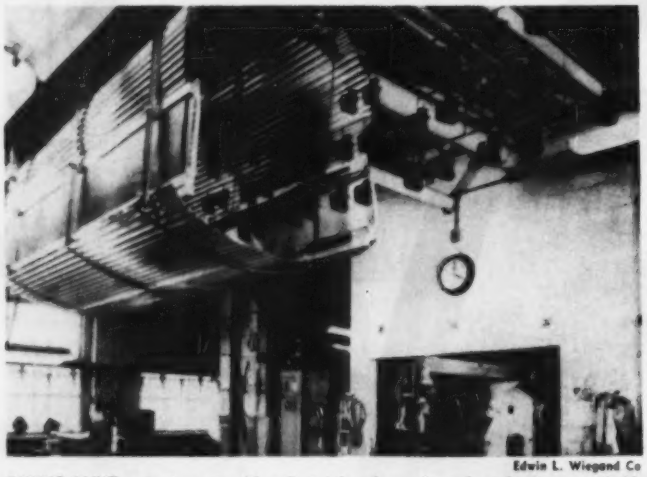
Vinylite BRAND **PLASTICS**

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

Memo to Wire Manufacturers

Do your specifications call for control cable that's equally effective in arctic cold of –67 deg. F. and tropic heat to 140 above—waterproof, with years of life, at low cost? Then write for Kabelitems No. 60. It gives essential information on the new VINYLITE Plastic Jacketing over polyethylene for light-weight, small-diameter, flexible control cable for severest duties.

INDUSTRIAL APPLICATIONS



Edwin L. Wiegand Co

BAKING PAINT on meter parts with radiant infrared oven located overhead saves valuable floor space. Conveyor system permits easy handling of both large and small parts

Paint Baked on 22,000 Parts in 8-hr Shift

A new infrared oven at the Foxboro Co, Foxboro, Mass., makers of industrial instruments for process, bakes paint on 22,000 separate meter parts in an 8-hr shift. Consisting of only four aluminum radiant heaters and reflective aluminum sheeting, the lightweight oven is conveniently located overhead, thus saving much valuable floor space.

All colors of paint are baked at about the same speed. Since radiant heat is directed and reflected into the work rather than convected around it, it has not been necessary to close the ends of the oven.

A flexible conveyor system permits easy handling of both large and small parts. Small items are hung on frames with three tiers. Larger parts are attached directly to main conveyor hooks. Total installed capacity of oven is 14.4 kw. Conveyor speed is 4½ ft per min.

Booster Heater Permits Sterilizing Dishes

A water heater with an electric immersion unit boosts hot rinse water from normal temperature to 180 F necessary for sterilizing dishes in cafeteria of Central School buildings, Rochester, N. Y.

These schools have the cafeteria kitchens located a considerable distance from the boiler rooms. Use of steam for this is impracticable due to heat losses incurred over distance it must be transmitted. Also no steam is available during milder months.

The normal hot water temperature of 140 F is quite satisfactory for dishwashing. By installing a 22.5-kw, 3 phase, 230-v booster heater in the 140 F water line, temperature of water is raised to 180 F for proper sterilization during rinsing. Heater consists of a steel pipe housing enclosing special electric immersion unit. Inside, the unit is electro-plated to prevent rusting, while the outside is heavily insulated.

The water temperature is maintained by thermostat with sensitive bulb inserted into water chamber through a hole in bottom. Thermostat maintains water temperature within 2 F by actuating a contactor which turns heating element "on" and "off." Due to the small size of heater, the radiation losses are low. The unit may be mounted on the wall where it does not interfere with the working areas. It is automatic in operation and instantly provides hot water of the temperature required. L. K. Franke, Eng, Comm & Ind Sales Dept, Rochester Gas & Electric Corp.

Silver Melting Time Reduced One Half

Melting silver at Leach & Garner Co, Attleboro, Mass., with a 35-kw high frequency (30,000 cycles) induction furnace has replaced gas and oil as heat sources. Customer says that it is twice as fast as the old methods, less hazardous, requires less labor, and leaves the immediate surroundings much cooler. Working conditions are improved. Furnace operates with a plate voltage of 7700 v at 2000 F and will handle 1000 oz per melt. G. B. Newton, Power Sales Eng. Attleboro Steam & Electric Co, Attleboro, Mass.

Doubling Life of Galvanizing Kettle

Heating galvanizing kettle at M. M. Hedges Mfg Co, Chattanooga, Tenn., with 300-kw electric resistance units increases life of kettle and makes it continuously available for production. There is less dross due to no overheating of zinc and working conditions are much better. Operation was started in March, 1946. Kettle was 1-in. thick fire box steel, 12 ft long, 4 ft wide, and 6 ft deep. It was operated continuously—heat always above 800 F and always automatically controlled for more than 6 years. When shut down, kettle was still holding metal perfectly and had not eaten through. W. G. Davies, Chief Power Sales Eng, Electric Power Board of Chattanooga, Tenn.

Air Conditioning Cost Cut with Resistance Units

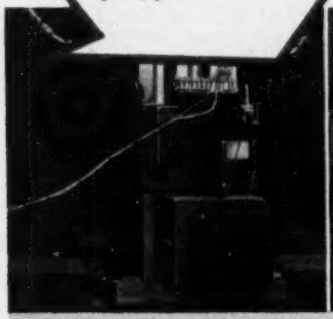
Humidity is automatically controlled by use of 40 kw of electric resistance heaters installed in air duct of an air conditioning system. System, which uses water cooling, is for a roller skating rink in the basement of the Honeywell Memorial Community Building, Wabash, Indiana. In mild weather these same heaters are used for raising temperature to comfort point by setting the automatic controls. This is much cheaper than firing up the large boilers when only a small amount of heat is required. R. A. Scholl, Ind Power Eng, Public Service Co of Ind, Inc, Kokomo, Ind.

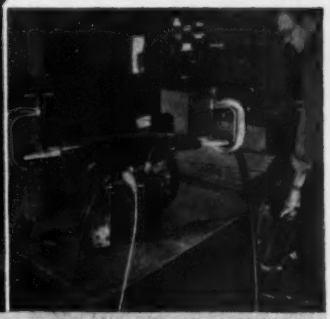
"A to Z" Testing Takes Guesswork Out of Switchgear Performance

Assures Quick Installation . . . Proper Operation . . . Long Life

THREE TYPES OF TESTS — design . . . inspection . . . and routine tests are used to check and double check Allis-Chalmers switchgear. Briefly, here is the careful, orderly system of tests used to assure you of a quality product.

ALLIS-CHALMERS METAL-CLAD Switchgear





1. Design Testing — Most spectacular in the whole long series of design tests is the short circuit test of a Metal-Clad Switchgear breaker. Other tests in this series include impulse, temperature, dielectric, life and radio interference tests.

2. Inspection Testing — Typical is this check of ratio and phase angle accuracy of an instrument transformer using highly accurate Silsbee set. Perfect operation of assembly is based on perfect operation of parts.

3. Routine Testing — Specially built portable test wagon makes possible testing of completed switchgear right on the assembly line. This versatile unit tests: circuits, meters, interlocks, control schemes, throwovers, phasing, potential and circuit transformers, relays of all types, dc equipment, etc.

TESTS

Design Tests:

short circuit interrupting tests
momentary current test
temperature rise
dielectric test — one minute — 60 cycle
impulse voltage test
operational life test
radio interference test
corona level
speed graph
minimum and maximum closing voltage test
repetitive operation test
transformer core loss test
transformer saturation test
transformer impulse test

Routine Tests:

one minute, 60 cycle dielectric test on primary and secondary circuits
closing and tripping test
minimum and maximum voltage test
speed graph
Check of: watthour meters, overcurrent and directional relays, instruments, etc. A 3 phase secondary current load and normal 3 phase potential is used
Control tests of: interlocks, throwover schemes, sequence operational schemes, control schemes

Inspection Tests:

instrument transformer dielectric test
instrument transformer ratio and phase angle tests
analytical tests of raw materials such as: copper, silver, steel, aluminum, brass, *Bakelite* insulation
inspection of component materials: meters, relays, insulation, porcelain

In addition to testing every removable element and every stationary element to assure proper performance, every one is built to master jigs to assure easy installation and interchangeability. For switchgear you can depend on, call your nearby Allis-Chalmers district office. Or write Allis-Chalmers, Milwaukee 1, Wis.

A-3815

ALLIS-CHALMERS

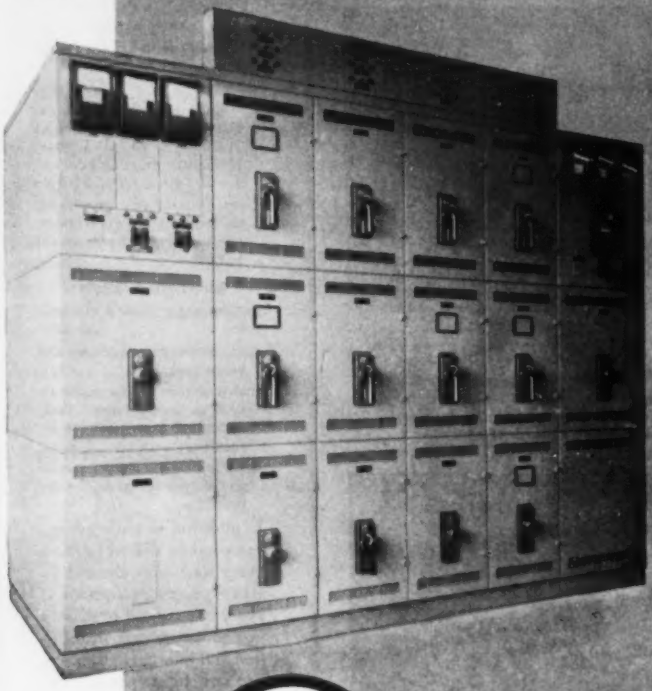
SWITCHGEAR DEPENDABILITY BEGINS

15,000 TO 100,000 AMPERES INTERRUPTING

600 VOLTS A-C, 250 VOLTS D-C

TO 6,000 AMPERES CONTINUOUS A-C OR D-C,
TO 10,000 AMPERES CONTINUOUS D-C ONLY

INDOOR AND OUTDOOR EQUIPMENT



When you buy low-voltage switchgear you buy protection for personnel and equipment. Protection against costly production loss if power should be interrupted by a "nuisance" overload. Protection against the expense of ruined equipment, spoiled processes, and the ravages of fire resulting from a short circuit. Only *circuit breakers* can provide this type of protection!

And to those fully familiar with *difficult* circuit protection problems, *circuit breaker* means *I-T-E*. The history of low-voltage-circuit protection parallels the development of I-T-E circuit breakers.

I-T-E Low-Voltage Switchgear takes advantage of every feature of I-T-E circuit breakers. Thus, it provides users with required protection and safety—along with bonuses of convenience and neat appearance. By specifying I-T-E Low-Voltage Switchgear, you know you have specified the finest circuit breaker.

You can get the complete story on I-T-E Low-Voltage Switchgear by writing for Catalog Section 6004. The I-T-E Circuit Breaker Company, 19th and Hamilton Streets, Philadelphia 30, Pennsylvania.

◆ Multiple "600" Combination for Types KA, KB, KC and LG drawout air circuit breakers—the combination for complete protection of low-voltage lighting, power, and distribution circuits.

I-T-E

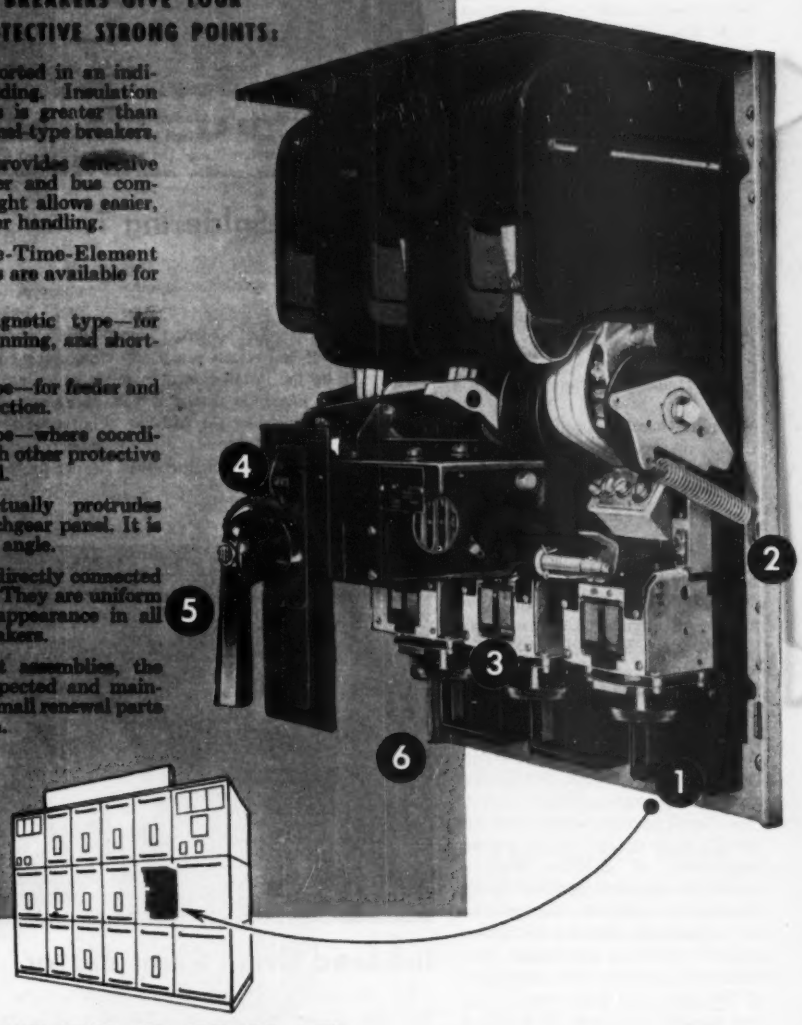
LOW-VOLTAGE

I-T-E CIRCUIT BREAKER COMPANY • 19TH AND HAMILTON STREETS • PHILADELPHIA 30, PA.

WITH CIRCUIT BREAKER PROTECTION!

I-T-E "K" LINE CIRCUIT BREAKERS GIVE YOUR SWITCHGEAR THESE PROTECTIVE STRONG POINTS:

1. Each pole unit is supported in an individual insulating molding. Insulation between adjacent poles is greater than with older, insulated-panel-type breakers.
2. Strong, metal panel provides effective barrier between breaker and bus compartments. Lighter weight allows easier, more convenient breaker handling.
3. Direct acting Inverse-Time-Element overcurrent trip devices are available for every application:
   - Dual thermal-magnetic type—for motor starting, running, and short-circuit protection.
   - Dual magnetic type—for feeder and short-circuit protection.
   - Dual selective type—where coordinated tripping with other protective devices is essential.
4. Position indicator actually protrudes beyond surface of switchgear panel. It is easily visible from any angle.
5. Operating handles are directly connected to breaker mechanism. They are uniform in size, location and appearance in all manually operated breakers.
6. Constructed from unit assemblies, the breakers are easily inspected and maintained. Inventories of small renewal parts are kept to a minimum.



SWITCHGEAR

R&IE Equipment Division: Greensburg, Pa. • Canadian Mfg. & Sales: Eastern Power Devices, Ltd., Toronto • Export Sales: Philips Export Corp., New York 17, N.Y.

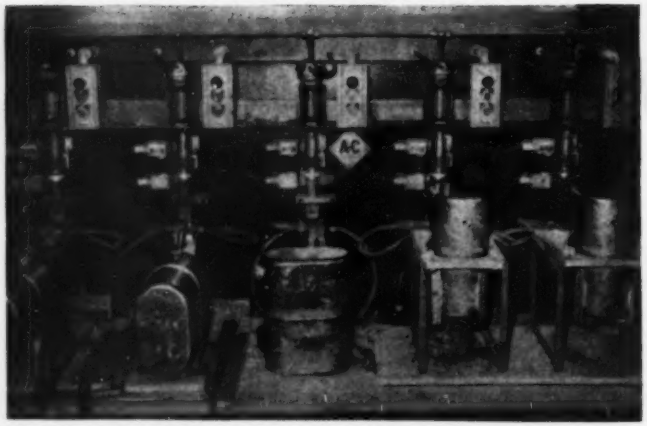
INDUSTRIAL BRIEFS

Preheating and drying enamel paint on jet engine stators at Thompson Products, Inc, Harrisburg, Pa., with a 12-kw infrared oven speeds production and conserves valuable floor space. Stators are spray painted and placed in the oven for two hours. Operation is repeated until three coats of enamel have been applied. U. S. Air Force specifications require infrared drying in jet engine contracts to obtain better quality paint surfaces. J. V. Ford, Industrial Rep, Pennsylvania Power & Light Co, Harrisburg.

Incubator heating at Wm. S. Merrell Co., Cincinnati, Ohio, with strip heaters provides accurate control and constant temperature, assuring greater yield of biological by-products. Room size walk-in type incubator has ten 200-w, 200-v strip heaters mounted on walls 1 ft above floor. Incubator is thermostatically controlled and has temperature range up to 60 C. A recording thermometer logs room temperature. 37 C is maintained during incubation periods. L. J. Langevin, Power Engineer, Cincinnati G&E Co.

Materials handling by 15 electric trucks throughout Continental Can Co's new plant at Mifflin Borough, Pa., insures efficient use of storage space and aids quick handling of materials in storage and from station to station. Electric trucks are quiet and safe. They have long life and are low in operating cost. K. P. Allen, Industrial Power Engineer, Duquesne Light Co, Pittsburgh, Pa.

Storage room heating with electric unit heaters has almost completely eliminated rejects of persimmon wood golf club heads at the Burke Golf Equipment Company, Newark, O. Company experienced numerous rejects due to dimensional changes when wood was brought from storage area to warmer temperature of machine shop. A specially-constructed, insulated storage room is maintained at same temperature as work area by two 3-kw thermostatically-controlled unit heaters. This eliminated expansion and contraction of the wood and has proved to be a very satisfactory answer to a difficult production problem. D. E. Dome, Comm-Ind Dept., Ohio Power Co, Newark, O.



INDUCTION HEATER has five station operations. Oval tanks being soldered only require three operations, but many other type tanks require five soldered joints. On this tank, station 1 does the filler, station 2 does the outlet, and stations 4 and 5 are set up for the body seam. All stations have individual timers and are interlocked so only one station is "on"

Gas Tank Soldering Time Cut In Half

A. F. **FALK**, Industrial Heating Eng, Wisconsin Electric Power Co, Milwaukee, Wisc.

Overall handling and soldering time was cut in half and rejects practically eliminated, by the installation of two 20-kw, 450-kc induction heaters at the Western Metal Specialty Co, Milwaukee, Wisc.

The old hand soldering method was slow, as well as hot and tiring for the employee.

The induction soldering process gives a much better appearing product, since the correct amount of solder is used and no excess is left on the tank. Working conditions have been greatly improved as soldering operation is now cooler as well as being considerably easier for the operator.

Infrared Dries Paint Faster

Portable driers cut paint drying time from hours to 15 min at E. Stroudburg, Pa., plant of Line Material Co; 375-w infrared lamps in gold plated reflectors are mounted on portable stands. They are handy for drying paint on coils, traps, control panels, reflectors, etc. Joseph A. Henchy, Foreman, Wired Radio & Fuse Cutout Dept.

DRIVING FURTHER

CRAIG WOOD, AMERICAN, PLAYING IN THE 1938 BRITISH OPEN ON THE FAMED ST. ANDREWS COURSE, SCOTLAND, DROVE A BALL 430 YARDS UNAIDED BY WIND OR ROLL ON HILL, FOR A DISTANCE RECORD

JENKINS

Gold Seal Tape

GOES FURTHER, TOO...

GUARANTEED FOOTAGE
You get full measure with every roll. Tapes up tight and snug to the last inch.

NO WASTE
All Gold Seal Friction Tape tears evenly, does not ravel, molds to uneven surfaces.

HIGH DIELECTRIC
Less Gold Seal Tape needed per job. No pinholes; one tape thickness insulates.

LASTING "TACK"
Gold Seal sticks to the job under toughest conditions of cold and moisture.

EASY HANDLING
Gold Seal does not peel, dry out or smear the hands in hottest weather.

SPEEDS THE JOB
Linemen and electricians prefer Gold Seal Tape. It saves time and trouble.

IT'S YOUR BEST BUY FOR PLANT SUPPLY
Specify Gold Seal Tape and save.

FRICTION AND RUBBER TAPES
In either 10-roll cartons or single rolls. Every roll sealed in cellophane, stays fresh. Jenkins Bros., (Rubber Division), 100 Park Ave., New York 17.

Jenkins Bros. also make Diamond Seal Friction and Rubber Tapes which meet ASTM and Federal Specifications.

A PRODUCT OF JENKINS BROS. . . . MAKERS OF FAMOUS JENKINS VALVES

GREEN FANS . . . Used by Many Leading Utilities

One significant fact about Green Fan Installations at the New Orleans Public Service Plant is that two different boiler manufacturers were involved . . . two different types of boilers but Green Draft Fans for all three boilers. Each boiler has two Green Induced Draft Fans and one Green Forced Draft Fan.

When a concern has specialized on an important piece of power plant equipment for many years, that firm is rightly called the "authority" on the subject. This is the position of Green Fuel Economizer Co. in the field of mechanical draft fans. The name Green is synonymous with Draft Fans highly acceptable to industry.

The Line of Green Induced and Forced Draft Fans includes many types in many sizes which are described in Bulletin No. 168. We shall be glad to discuss your fan requirements with your own engineers, with your consulting engineers and with the boiler manufacturer of your choice.

THE GREEN *Fuel Economizer* COMPANY INC.

BEACON 3, NEW YORK

ECONOMIZERS • FANS • AIR HEATERS • CINDERTRAPS

Electric Steam Generators Best For Pressing

Finish pressing of sports garments at the Biltmore Mfg Co, Asheville, N. C., using electrically-heated steam generators increases flexibility of individual units at the point of use. Steam is ready for use in a few minutes, thus aiding their one-shift operation.

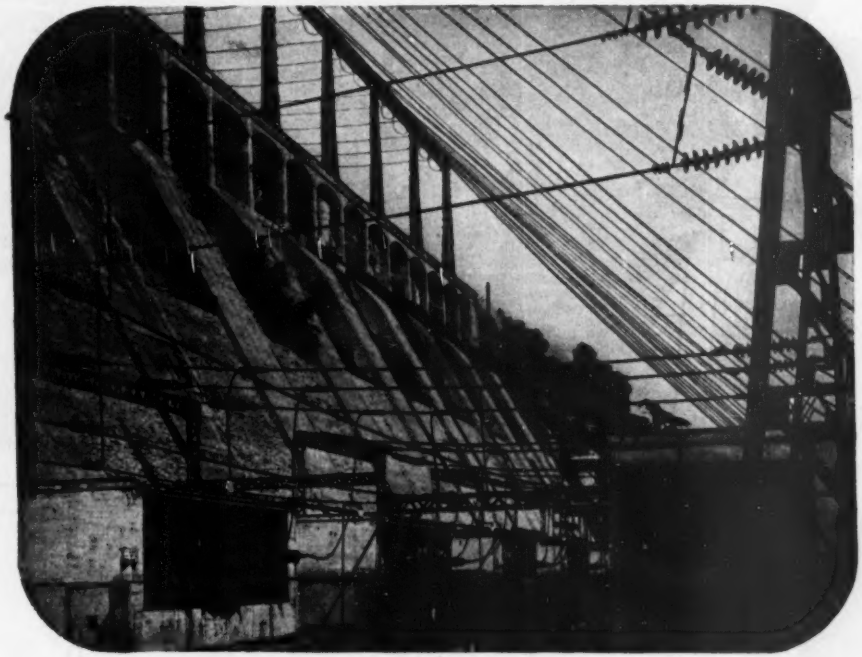
Automatic control, safety, cleanliness, and economy of operation also sold the management of this plant on this electric equipment. Plant first started using electric steam units in 1948 when five small 3-kw boilers were installed, each furnishing heat for two hand irons. These have been in constant use on a one-shift basis and have given trouble-free dependable service during that time. When blue denim jeans were produced, heavier pressing equipment and additional steam volume were needed. A new 35-kw (3.5 boiler hp) electric boiler has been installed which, with a 5-kw unit already in use, will furnish steam for four presses. A. C. Sutton, Ind Power Sales Eng, Carolina Power & Light Co, Asheville, N. C.

Paper Finishing Roll Installation Saves $1500

Calender roll heating installation with 15-kw radiant infrared bank at Dewey & Almy Chemical Plant, Adams, Mass., cost only about $500 compared with $2,000 for a steam-heated installation according to Mr. Holt, plant engineer. Installation is used for finishing paper and is operated during the second and third shifts, thereby remaining off the company's peak demand and incurring no additional demand charge. Uniform temperature is maintained by use of a thermostat mounted below the reflector.

Mr. Holt states that under these conditions the operating cost for electric heating is less than for a steam heated calender roll. Repair and maintenance are almost negligible with the electric system but are appreciable factors with a steam system. Installation was designed by Howard Hands of the New England Power Service Co and installed by the Dewey & Almy Chemical Co personnel. B. D. Barry, Northern Berkshire Gas Co, North Adams, Mass.

V. C. CABLE



Specify Roebling V. C. Cable for top resistance to heat, oil and grease

THROUGH continual laboratory developments and progressive manufacturing methods, Roebling Varnished Cambric Cable has been constantly improved. Today this cable has absolutely top resistance to heat, oil and grease . . . and it's the most dependable cable you can use for leads on generators, transformers, motor and oil switches, and for general distribution of heavy power loads in manufacturing and industrial plants.

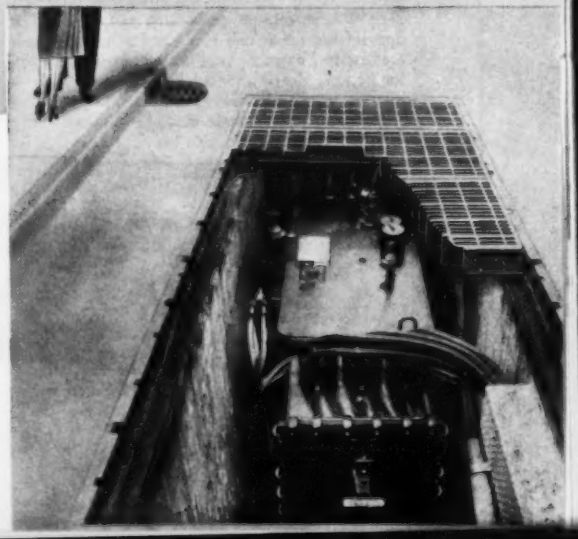
Roebling V.C. is made in single conductor sizes from 2,000,000 C.M. to #14 A.W.G.; in multiple conductor sizes from 750,000 C.M. to #14 A.W.G. Recommended for use to 17,000v between phases in single or multiple conductor construction; and to 26,000v for single conductor grounded neutral.

Large quantities of Roebling's complete wire and cable line are now required for rearmament. We and our distributors will, however, do all that we can to meet your needs. John A. Roebling's Sons Company, Trenton 2, N. J.

ROEBLING

ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. & 5 PITTSBURGH ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. & 120 S. HEWITT ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • PITTSBURGH 1301 CLARK BLDG. • ROCHESTER, 1 FLINT ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • ST. LOUIS, 3001 DELMAR BLVD. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE TRENTON 2, NEW JERSEY

The Jamaica network (a portion of which is pictured above) is an outstanding example of the long-run economy of networks in areas of growing load. Established in 1927, this network now consists of 258 transformers serving 120/208-volt secondaries from 27,600-volt feeders. Of the total demand of 64,000 kw, more than 35% developed in the years 1945 through 1949.



For the majority of their installations, Con Edison uses a standardized liquid-filled submersible transformer in a precast concrete vault. Readily accessible when necessary, vaults are out of the way under sidewalks or streets.

Consolidated Edison reports:

Only a Network· could expand like this

In Jamaica, a section of Queens Borough, New York City, Con Edison experienced recurring load "growing pains" for years. Then in a boom of commercial remodeling, demand shot up; the problems could have become acute. In one city block, revamping and air conditioning a department store boosted demand from 570 to over 2,100 kw within three years.

But Consolidated Edison had foreseen the possibilities; had a network well established.

"The expansion was comparatively simple," they report. "No service interruption. No overtime rush. Existing facilities handled the load until new installations could be completed."

Similar situations arise continually. "Even in some suburbs," they find, "where load growth is a reasonable certainty, networks offer long-run economy."

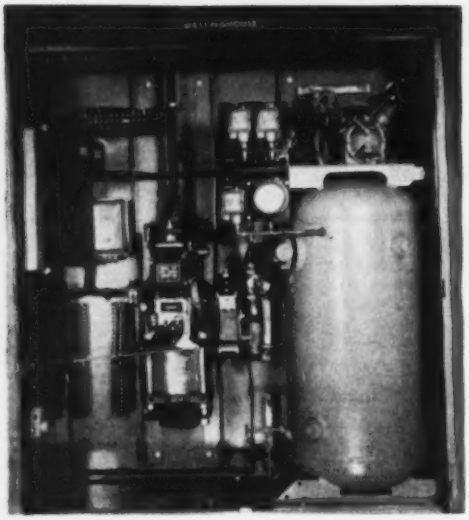
Reliability and flexibility are the characteristics that make the change-over to network systems pay in areas where loads are growing. By practically eliminating outages, they experience fewer emergencies, avoid overtime repairs. Load problems are handled easily. And there's another all-important advantage: the value of outages avoided in dollars and in customer good will.

The reliability of modern network transformers is a vital factor in the success of any network installation. Networks make severe demands on transformer performance, particularly when secondary faults must burn clear, and when emergency overloads are carried to maintain service.

Westinghouse Engineers, working in conjunction with electric power companies, pioneered network installations and the transformers they require. Today, Westinghouse Transformers meet highest standards with features that assure trouble-free service. For specific information, ask your Westinghouse Representative for booklet B-4082A, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70627

YOU CAN BE SURE...IF IT'S
Westinghouse
NETWORK TRANSFORMERS

NEW EQUIPMENT



Pneumatic Mechanism

For closing power circuit breakers of high interrupting capacity. Claimed to be more powerful than solenoid mechanisms, it is available with 7 or 10-in pistons, Type AA-7 and AA-10 respectively, for closing breakers rated from 14.4 kv 500,000 kva through 230 kv 15,000,000 kva.

High speed reclosing in 20 cycles, ultra-high in 15 cycles or less, or multiple high-speed reclosing are possible. Factory adjusted, parts easily accessible. Claimed mechanically and electrically trip-free. Air compressor driven by single-phase motor can charge reservoir tank for five operations.

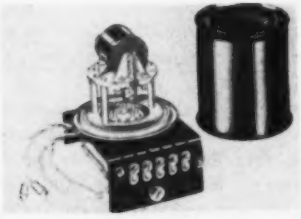
Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

Pole Top Gin

Used to hoist transformers, switches, other heavy equipment, the gin fits atop any solid pole. Beam rotates in a complete circle, can be raised or lowered 60 deg. Light duty size weighs 35 lb, heavy duty size 58 lb.

Through combinations of sheave blocks, gin has lifting capacities to 2500 lb.

A. B. Chance Co, Centralia, Mo.



Synchronous Inverter

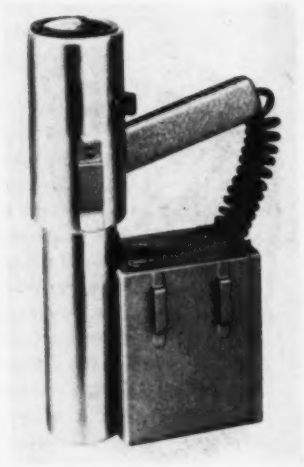
With 0.05 microvolt sensitivity, less than ½ % dyssymmetry claimed, converts dc signals as low as 0.05 microvolt to alternating voltages. Operates from 0-3,500 cps. Hermetically sealed.

Bristol Co, Waterbury 20, Conn.

Soil Resistivity Apparatus

Model 42 is lightweight, claimed simple to operate and accurate for spot checks of soil or water resistivity or detailed pipe line survey work. Apparatus consists of 40-in hexagonal steel rod with handles and insulated top, ac resistivity bridge in leather case, head phones for balancing bridge by null method. Tone buzzer in bridge gives 1,000-cycle tone from one 4½-v dry cell. Bridge weighs 1¾ lb measures 6 x 3 x 2½ in.

J. L. Collins, Angleton, Texas



Scintillation Counter

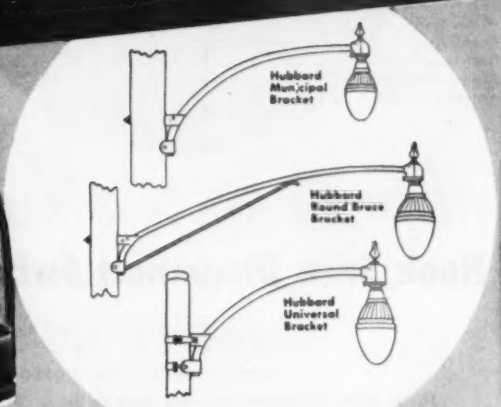
Said to have 100 times sensitivity of Geiger counter. Portable, battery box weighs less than 4 lb, probe weighs 2 lb. Waterproofed.

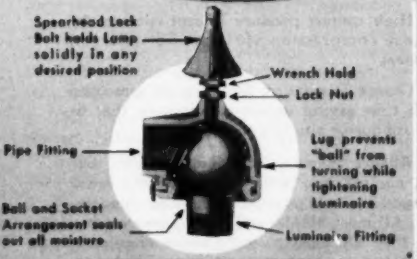
Scale ranges 0.05, 0.5 and 5 milliroentgens per hour, accuracy claimed 5% of ¾ full scale. Instrument will register from height of an airplane.

Precision Radiation Instruments, 2235 La Brea Ave, Los Angeles 16, Calif.

(*Continued on page* 156)

THE *Adjustable* HUBBARD LEVELITE* SOLVES STREET LIGHTING PROBLEMS




Spearhead Lock Bolt holds Lamp solidly in any desired position
Wrench Hold
Lock Nut
Pipe Fitting
Lug prevents "ball" from turning while tightening Luminaire
Ball and Socket Arrangement seals out all moisture
Luminaire Fitting

A maximum swing of 34° is possible in any one direction, 17° in any direction from the vertical, or center line of the Levelite.

Furnished with 2-inch pipe thread to fit 1¼-inch or 2-inch pipe threaded Luminaire; and with 1¼-inch pipe thread to fit 1¼-inch pipe threaded Luminaire.

*NOW AVAILABLE IN HAPCO ALUMINUM ALLOY AS WELL AS IN GALVANIZED MALLEABLE IRON

The Hubbard LEVELITE allows a wide flexibility in adjusting the luminaire for street lighting installations. Luminaires may easily be plumbed and leveled, even though the pole is as much as 17° from vertical in any direction. Or, they may be purposely tilted to avoid obstructions in the desired path of illumination.

The LEVELITE uses a ball and socket movement, which effectively seals itself against moisture. Permanent setting is maintained by a single "spearhead" bolt and lock nut. Changes in the angle may be made easily and quickly, before or after installation.

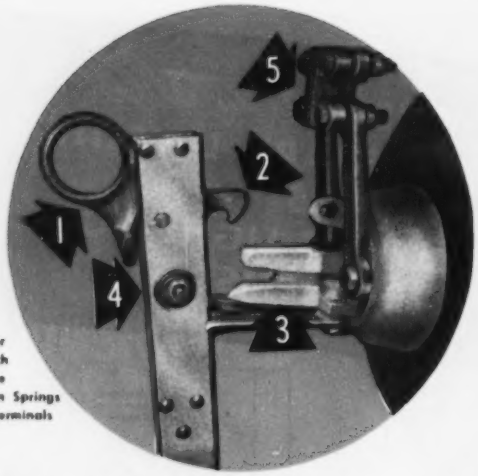
Hubbard LEVELITES make an ideal combination with Hubbard Upsweep Street Lighting Brackets, made of Hapco Aluminum Alloy, or steel. Write for bulletins describing them if you don't have copies in your files.

HUBBARD AND COMPANY

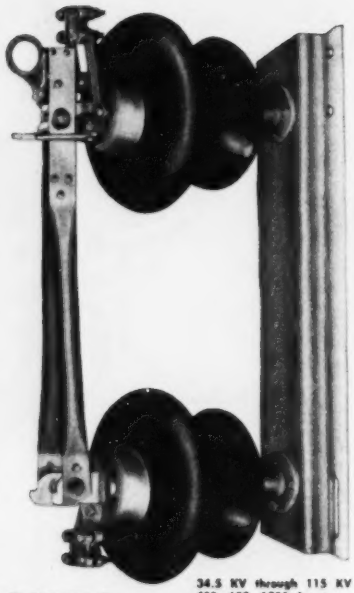
ESTABLISHED 1843

PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA

"Hang the Load on Hubbard Hardware!"



1. Pryout Lever
2. Double Latch
3. Split Tongue
4. Compression Springs
5. Universal Terminals



34.5 KV through 115 KV
400, 600, 1200 Amps.

Here's New Sturdiness in Hook Stick Disconnect Switches

CHANCE BT SWITCHES

Hook Stick Disconnect Switches *have* to be rugged. Heavy side thrusts—when the closing force must be applied from an angle – cause some switch blades to flex and make quick, sure contacts impossible.

That's why CHANCE Hook Stick Switches are designed with emphasis on *really rigid* contact blades—like the double-trussed tubular blade that gives unequalled strength to Chance Switches from 34.5 through 115 KV . . . the heavy flat parallel bus bars that serve as blades in the 23 KV and smaller 1200 amp. switches . . . or the flange-reinforced bus bar blades on the 400 and 600 amp. switches rated 23 KV and below.

In addition to rigid blades, Chance Disconnect Switches have many other features that add up to smooth operation through many years of service. Five of these are shown in the inset above.

1. A downward pull on the extra large ring actuates a powerful pryout lever that works like a claw hammer to break ice accumulations with ease.

2. Double latch hooks lock the blade in position so firmly that even tremendous magnetic forces caused by heavy faults can't make the switch open. The latch is held securely by a non-ferrous, sleet-protected spring inside the blade end.

3. A split tongue contact always centers clip pressure directly over the contact area.

4. High contact pressure is kept constant by bronze compression springs and spherical washers.

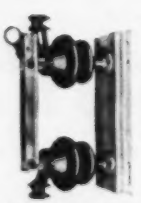
5. Chance Disconnect Switches are equipped with time saving universal terminals that fit any conductor size you use.

All Chance switches have flanged bases that will not cut into wood structures and cause constant maintenance problems after installation. All meet NEMA and AIEE requirements and they all have passed Chance engineers' severe tests for high currents, icing, insulation characteristics and long life. Why not get full details today?

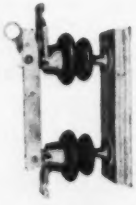
You know it's RIGHT when you specify CHANCE

A·B·CHANCE CO·

CENTRALIA, MISSOURI
SAN FRANCISCO, CALIFORNIA



7.5 KV through 23 KV
400, 600 Amps.



7.5 KV through 23 KV
1200 Amps.

Type WN Switch

1. Flanged Mounting Base.
2. Free Swinging Clamp.
3. Easy Shaft Installation.
4. Easy Adjustment.

Here's an Easier Way
to install Gang-Operated Switches

CHANCE WN-VN SWITCHES

permit quick installation of interphase shaft without "threading"

Chance Tilting Insulator Switches for outdoor gang operation give you always reliable switching under all conditions. The reason? . . . Such operating advantages as the exclusive Compensator Control Mechanism that means positive performance under all conditions—"Crow Bar" Leverage that breaks heavy ice with ease—Compensation for structural warpage—and *New Ease of Installation.*

WN-VN Switches *are* easier to install than any other gang-operated switches. The arrows in the illustration above point out the features that make installation simple.

1. The flanged base has double slots and slotted holes for ready installation on all standard construction. (Front mounting brackets are supplied for steel structures.)

2. The clamp on each switch swings open to permit the interphase shaft to be laid in position *after* the switch units are mounted.

3. The interphase shaft bar is then inserted in all three phases at once—without the necessity of "threading" through small fittings.

4. Easy adjustment (only necessary under unusual conditions*) is accomplished by pulling the stainless steel pin which connects the compensator control rod, loosening the lock nut (4), and turning to adjust.

All control connections on Chance WN-VN Switches are made with clamp type fittings for maximum flexibility.

Rugged "torture rack" tests prove that the performance of these switches is not affected by any conceivable warpage of cross-arms—Ice tests prove their exceptional ability to open and close without difficulty when coated with over ¾" of hard, clear ice. Chance WN-VN Switches can be isolated, while energized, with Hot Line Tools for live line maintenance.

For reliable switching *plus* time saving installation advantages, specify Chance Type WN or VN Switches.

Send for complete catalog information or test data or consult Section 11B of your Chance catalog.

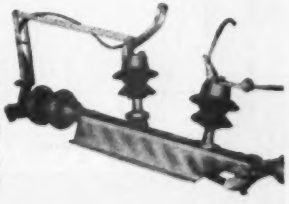
**All WN or VN switches are factory adjusted for proper contact and gap clearance before shipment.*

You know it's RIGHT when you specify CHANCE

A·B·CHANCE CO.

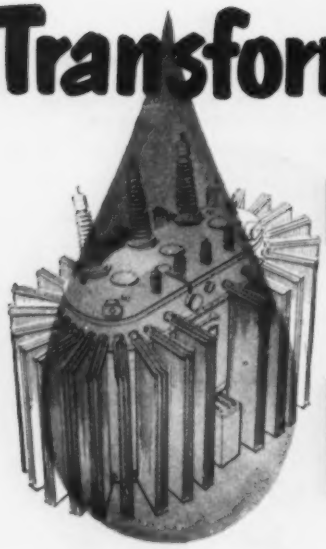
CENTRALIA, MISSOURI
SAN FRANCISCO, CALIFORNIA

C52-10



Chance Type VN 200 Amp. Switch. A two-insulator tilting type switch built for service and economy.

Transformer Oils last longer with DBPC



When Di-tert-butyl-para-cresol (DBPC) is added in liquid form to transformer insulating oils, their resistance to oxidation is increased and their useful life is greatly extended.

The value of Koppers DBPC as an inhibitor for new or reclaimed oil has been proved. Actual use has confirmed the accelerated oxidation tests shown below. Further, many manufacturers of transformers now endorse the use of DBPC, and most major suppliers of transformer oil will, on request, furnish new oil that has been inhibited.

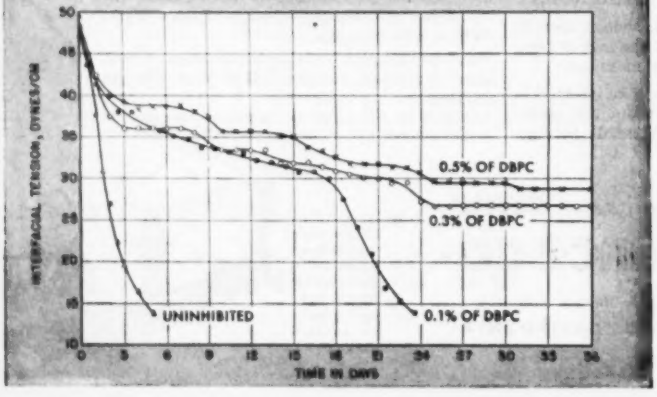
When ordering new or make-up transformer oil, make certain it is inhibited. And use DBPC to prolong the life of your reclaimed oil. The savings you'll get will be worth your while.

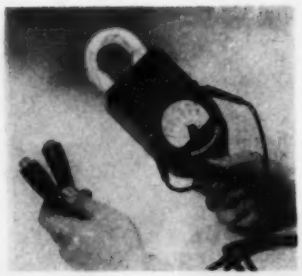
If desired, we can furnish a compounded oil solution of DBPC called Impruvol 20. Impruvol 20 can be used with simple equipment. Its application presents no more problem than the application of insulating oils themselves. Order Koppers DBPC or Koppers Impruvol 20; the choice is yours.

KOPPERS ®

KOPPERS COMPANY, INC.
Chemical Division **Pittsburgh 19, Pa.**

Interfacial Tension values under 95°C Oxidation Tests show DBPC inhibited oil impressively delayed in oxidation and at no stage as rapid as uninhibited oil.



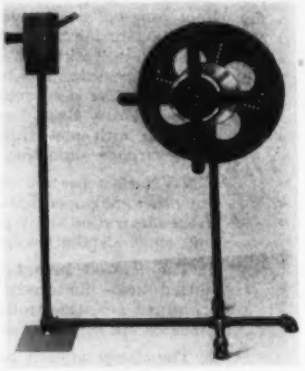


Hook-on Volt-Ammeter

Type AK-1A will measure ac on five scale ranges: 0-7.5/30/75/300/-750 amp, on both insulated and non-insulated conductors. Ac voltages measured on three ranges: 0-150/-300/750 v, by attaching terminals to the line and turning selector switch.

Pointer-stop mechanism shows peaks in motor starting currents. Errors claimed less than 2% by dovetail joint on magnetic jaws. Shielded magnetically, so 500 amp one foot away cause negligible effect on 300/-750-amp ranges.

General Elec Co, Schenectady 5, N. Y.



Wire Measurer

Consists of meter and take-up reel mounted on steel framework. Meter takes wire, rope, other flexible material to 1-in dia, registers to 1,000 ft. Reel dimensions 18¾-in dia x 7 in wide, holds 1,500 ft of No. 14 wire.

HyKon Mfg Co, Alliance, Ohio

Insulating Protector

A plastic protector for covering mechanical jumpers on power lines.

EASIER SERVICING

Another reason why most control center buyers specify WESTINGHOUSE

Give a man a screw driver and he's all set to go to work on a Westinghouse Control Center. With this simple tool he can open unit doors, remove and replace units, disassemble units, wire units and wire complete vertical structures. And all he needs is ONE screw driver because all screws and parts are accessible from the front.

All men go for the fact that removing and replacing starter units is positive and not a matter of "feel and twist". Guide rails, located on either side of each starter unit, make this a positive operation . . . as simple as opening and closing a filing cabinet drawer.

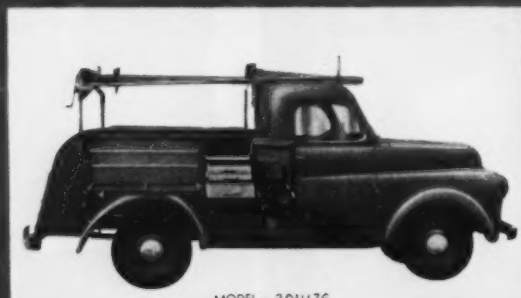
Then there are those operations that can be performed right on the structure. Each unit can be pivoted forward to the tilt-out disconnect position where it is completely disconnected from the power buses and is "dead".

What about your control center problem? Call in your local Westinghouse application engineer. He will help you work out the details to meet your specific needs. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-27022

YOU CAN BE SURE... IF IT'S
Westinghouse
CONTROL CENTERS

YORK-HOOVER

60 YEAR POLICY PAYS OFF IN FASTER, BETTER SERVICE FOR YOU



OUR 60 YEAR POLICY . . .

Strict adherence to an iron clad policy established in 1892 . . . the policy of producing only quality merchandise at a fair price . . . at all times . . . and under any conceivable economic condition . . . pays off in faster, better service for you . . . for both light and heavy duty public utility operations.

HOW IT BENEFITS YOU . . .

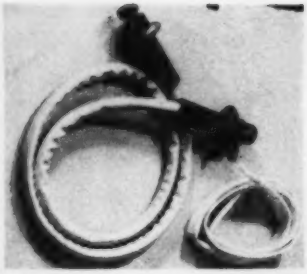
Consistent with this policy . . . factors that contribute to the satisfaction of our customers are . . . engineering the body for the specific job to be done . . . meticulous attention to all metal fabricating details . . . plus strict adherence to rigid inspection standards.

CUSTOMER SATISFACTION . . .

You can rely with confidence on York-Hoover Truck Bodies because you not only get top quality workmanship, but enjoy lower maintenance costs and efficient performance at all times. For Public Utility Bodies that pay off in faster, better service for you . . . buy York-Hoover!

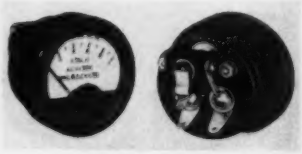
1952...OUR 60TH ANNIVERSARY YEAR

YORK-HOOVER CORPORATION
YORK, PENNSYLVANIA



Plastic is bright yellow, is said to be unaffected by oil, grease, water, corona, sunlight or freezing. Weighs 1⅛ oz per ft and fits all cables to 1⅛-in. dia. Said to pass 10,000-v test.

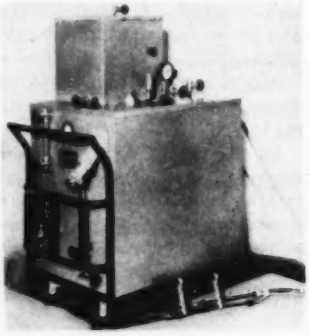
Charleston Rubber Co, Charleston, S. C.



Illuminated Meter

Round or square, Models 150 and 153, 1½-in panel meters have external lamp housing. Light passes through D'Arsonval movement and illuminates translucent plastic scale. Designed to meet government specs for watertight sealed meters.

International Instruments Inc, Box 2954, New Haven, Conn.



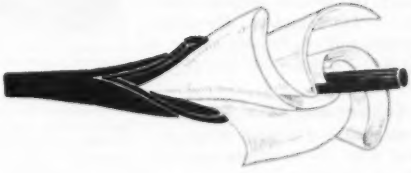
Steam Cleaner

Operates at pressures to 200 psi with jet speeds to 1200 fps. All electric, it has no moving parts. Portable,

forget about **this**

DURALINE* provides added assurance against power outages caused by moisture, whether in the form of rain or sleet or snow. Duraline won't festoon, is more resistant to damage by foreign objects.

install Duraline . . .



DURALINE beats the weather in any season. Its exclusive, continuous interlocked fibrous sheath is thoroughly impregnated with genuine URC saturants and covered with URC finishers.

For the full technical story on Duraline with copper, Copperweld or aluminum conductor, just contact your nearest Anaconda Sales Office. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

*Reg. U.S. Pat. Off.

the right cable for the job

ANACONDA® WIRE AND CABLE

Modern Plant POWER Distribution—

SAV[illegible]PPER & STEEL

Distribute
High Voltage . . . 460-575

Provide
Low Voltage Where Required . . . 115-230

Increase power capacity for expanded production in your present plant and gain maximum economies of material and labor in the wiring of the new plant. Distribute only *high* voltage. Provide *low* voltage at the point of use with Jefferson Air-Cooled Power Circuit Transformers. Eliminate duplicate wiring circuits (one for high and a second for low voltage). Save critical materials, and cut your labor costs.

S-T-R-E-T-C-H Copper and Steel Supplies

Example 1. A plant distributes 230 volts at 15 amperes through 14 size wire — maximum capacity is *3,450 voltamperes.*

Example 2. Using Jefferson Power Circuit Transformers to step down voltage where needed, the same wiring now distributes 460 volts at 15 amperes —maximum capacity *6,900 voltamperes.*

You can *stretch* your critical material allocations and modernize and increase power capacity at low cost with minimum labor by installing Jefferson Transformers. It will pay you to investigate now. Bulletin 501-15 gives full selection data. Copy free on request.

No special vaults are required.—Each transformer is complete with roomy wiring compartment having knockouts for rigid or flexible conduit connections.

Approved by Underwriters' Laboratories, Inc.

STOCK SIZES

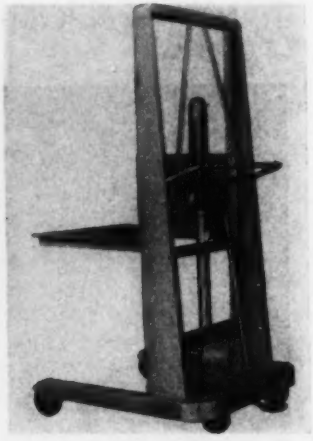
50 V.A. to 15000 V.A. 460/230 Volt Pri. — 230/115 Volt Sec. 575 Volt Pri. — 230/115 Volt Sec.

JEFFERSON ELECTRIC COMPANY
Bellwood, Illinois

JEFFERSON DRY TYPE TRANSFORMERS

for use in cleaning and sterilizing without flooding working area. Solvents and detergents may be used.

Livingstone Eng Co, Worcester 5, Mass.



1000-lb Lift

Manually operated and controlled, hydraulic lift weighs 150 lb, lifts 1,000 lb from floor up to 4 ft. Material platform 23x24 in. is lowered under control of operator. Base area 29x34 in., height overall 64 in.

Dept KP, Century Products Co, 5925 Highway 7, Minneapolis 16, Minn.

Magnetic Probe

Fountain pen size, strength of magnet is controlled by amount of extension. Dia ¼ in, length 6¼ in. Useful for removing steel chips from electrical machinery, instruments.

General Scientific Co, 2700 W Huntingdon St, Philadelphia 32, Pa.

Coil-chain Hoist

With ratchet-lever which is claimed to prevent slipping or freezing, elimi-

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INDUSTRIAL MARKETING (June 1952)

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CIRCUIT RIDER (Vol. 6, No. 2, published by Electrical Construction and Maintenance)

". . . Heat Stability Plus: Visitors . . . see, among other demonstrations, how Silastic (Dow Corning's silicone rubber) remains soft and flexible at temperatures far above the limits of organic rubber . . ."
CHEMICAL WEEK (Jan. 26, 1952)

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DOW CORNING SILICONES . . . are no longer a mystery or a "future possibility" to the 17,000 executives and engineers, representing more than 4600 plants, who have already seen the Dow Corning Silicone Exposition.*

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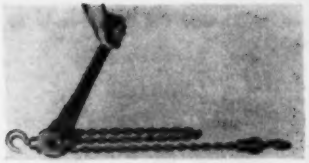
DOW CORNING CORPORATION
MIDLAND, MICHIGAN

CANADA: Fiberglas Canada Ltd., 1200 Bay St., Toronto, Ontario
ENGLAND: Midland Silicones Ltd., 49 Park Lane, London, W.1



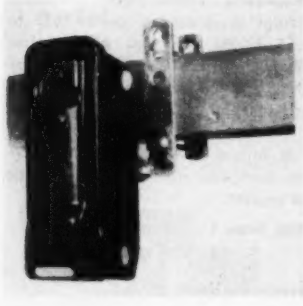
nating need for a friction brake. Handle of Model R operates in any position, with partial or full strokes. Unit is available in 1,500 and 3,000-lb capacities. Each unit is factory tested to 100% overload.

Coffing Hoist Co, 800 Walter St, Danville, Ill.

Manmade Fiber

Made from aluminum oxide and sand in a process requiring no critical materials, "Fiberfrax" is claimed to resist temperatures that melt cast iron. Projected uses included superfilter, high-temperature insulation, fireproof and electrical papers. Inert, light weight of 2 lb per cu ft.

Carborundum Co, Perth Amboy, N. J.



Heavy Duty Cutouts

Interrupt 8,000 amp at 5 kv and 12,000 amp at 2.5 kv, are rated 5.2 kv 100 and 200 amp. Reflectors on the

Eliminate

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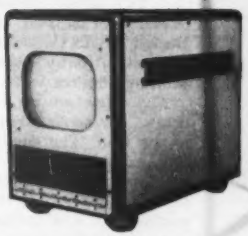
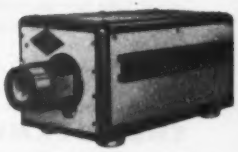
No production system is entirely automatic or perfectly integrated, because many operations and processes refuse to be self-disciplined . . . they must be watched. Often several operations need watching simultaneously to keep them in step. Such irregularities and uncertainties are a continual source of question marks that waste time and money.

The Diamond "Utiliscope" (wired television) enables you to eliminate these question marks. With it your supervisory staff can SEE what is going on at remote, inaccessible or dangerous points. A clear picture is transmitted of what is happening AS IT HAPPENS. Installations in many kinds of plants have proved that the "Utiliscope" can make important savings of time, money and manpower . . . in addition to improving safety. For further information, ask for Bulletin 1025.,W.



"UTILISCOPE" RECEIVER



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TYPICAL USES—Checking remote gauge readings • Watching flow of molten steel • Viewing nuclear research • Observing conditions inside furnaces Coordinating materials flow on conveyors. • "Utiliscope" (Reg. U.S. Pat. Office)

WRITE FOR BULLETIN 1025W

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Since 1903, Diamond has Manufactured Quality Equipment For Industry

high efficiency AEROTEC
DUST COLLECTORS
Partially erected collector showing inlet, outlet and dust discharge passages.
New Niagara-Mohawk Power Corporation Dunkirk Steam Station, equipped with Aerotec Dust Collectors.
assure your plant

NIAGARA MOHAWK POWER CORPORATION

Dunkirk Station . . . and a duplicate Albany Plant

At the new Dunkirk Steam Station of Niagara Mohawk Power Corporation, two reheat steam generators of 670,000 lb. per hour capacity are pulverized fuel-fired. Dust collection for this station is handled by Aerotec, Design 3 RAS Collectors, and a duplicate system is under construction for the new Albany Steam Plant . . . making a total of eleven Niagara Mohawk boilers to be equipped with Aerotec Dust Collectors.

The collectors for Dunkirk and Albany consist of 84 "Unit Building Block" elements completely assembled at the factory for easy erection in the field. The small diameter tubes, of permanent molded aluminum construction, have proved their extremely high collection efficiency and long life on hundreds of installations. Their light weight cuts steel requirements for supporting structure, and makes possible roof installations with a minimum of reinforcement. The light weight tubes also reduce erection costs.

Aerotec efficiencies meet or exceed the requirements of most dust ordinances today. Evenly spaced tube outlets provide excellent inlet flow conditions for an AEROTEC electrical secondary—should future ordinances require still higher efficiencies.

Write for the new Design 3 RAS Catalog No. 601.

Project and Sales Engineers

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Manufacturers of mechanical dust collectors, electrical precipitators, air cleaners, industrial integral dust collectors, gas-oil scrubbers and dust reclaiming equipment.

cutout doors distinguish these units from standard duty cutouts.

General Electric Co, Schenectady 5, N. Y.

Nylon Harness

Designed for tree trimming, claimed to sustain 250 lb on a 5-ft drop. Floating D-ring at front is attached to safety line. Adjustable 36-44 in.

Mathias Klein & Sons, 3200 Belmont Ave, Chicago 18, Ill.

Deadend Clamp

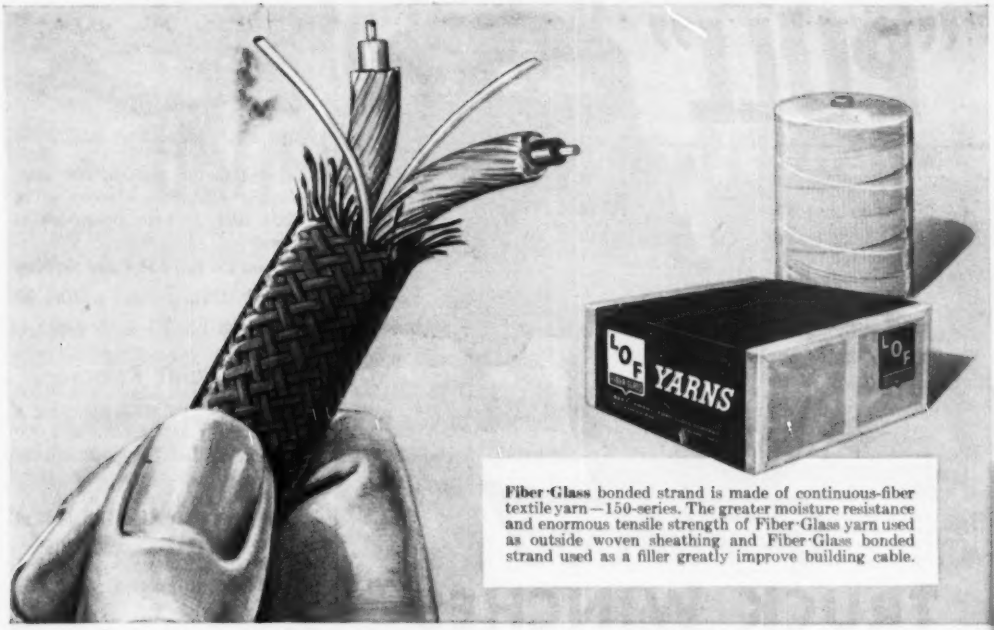
To simplify deadending large diameter aluminum conductors in primary and secondary distribution and in station buses. Five Strateline clamps accommodate cables 0.15 to 1.55 in dia, the four smaller sizes designed for tensions to 2,000 lb per phase and the largest for slip strength of 8,000 lb.

Clamps are available in malleable iron, bronze or aluminum, with liners for malleable iron clamps available on request.

Ohio Brass Co, Mansfield, Ohio

Fuse Puller

Featuring a toggle action for double leverage and greater gripping strength. Said to prevent fuses from slipping out of jaws. Weighs 2 oz, 7½ in



Fiber·Glass bonded strand is made of continuous-fiber textile yarn—150-series. The greater moisture resistance and enormous tensile strength of Fiber·Glass yarn used as outside woven sheathing and Fiber·Glass bonded strand used as a filler greatly improve building cable.

It's surprising what two little strands can do in a cable

Libbey·Owens·Ford's 50 years' experience in glass making helps make better electrical material

DID YOU ever notice how a cable suspension bridge is built? Huge anchored cables stretching over high towers carry the load because of the enormous tensile strength of the cables.

The electrical industry today has nonmetallic, sheathed cable that is lighter and stronger because of two little strands of fiber glass which act as filler strips. Bonded strands, made of L·O·F Fiber·Glass, make it possible for cables to better support their own weight.

L·O·F Fiber·Glass has gained wide acceptance as superior electrical insulation on motors and generators where space and overloads are factors. Fiber·Glass resists temperatures up to 800 degrees F. It has low moisture pickup, is rotproof and resists the effects of corrosive liquids and gases.

Investigate the ways you can use L·O·F Fiber·Glass as insulation for your electrical products. Contact the nearest L·O·F office (district offices in 25 major cities). Or write, wire or phone Libbey·Owens·Ford, Dept. F·G 10102, Nicholas Building, Toledo 3, Ohio.

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THAT PULLS DOWN COSTS

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They're tougher . . . last longer . . . pull more and faster . . . safer to operate . . . require less maintenance . . . are always ready in emergency. Gar Wood Winches have the "pull" to get more work done, and pull down costs. Many exclusive features of construction make them the winches preferred by Utilities throughout the country. Write for Bulletin.

GarWood

TRUCK CRANES

Can't be beat for safe, fast, low-cost handling of conduit, poles, transformers, tree-trunks, switchgear, and all the other loads you need to lift. Built to take minimum space behind cab, leaving body unobstructed for maximum pay load. Sizes from 2,000 to 24,000 lb. Write for Bulletin WC-202.

52-12

GAR WOOD INDUSTRIES

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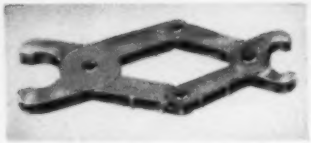
Wayne Division • EXECUTIVE OFFICES, WAYNE, MICHIGAN

TRUCK EQUIPMENT: Dump Truck Bodies & Hoists, Winches & Cranes, Refuse Collection Bodies, Elevating End-Gates. CONSTRUCTION EQUIPMENT: Excavators, Scrapers, Dozers, Ditchers, Spreaders, Finegraders, Truck-Mounted Road Graders.



long, and fits all fuses to 100 amp. Dielectric strength is claimed to be 4,000v after 24 hour immersion in salt water.

Star Fuse Co Inc, 235 Canal St, New York, N. Y.

Electric Paint Remover

Consists of two skids mounting a Calrod tubular heater rated at 1,000 w 115 v. Radiant heat softens paint which is then removed with putty knife. Skids keep the heat a constant distance from the painted surface, and metal reflectors keep handle cool. Weighs 2¼ lb, 6½ in long, with 8-ft heavy duty electric cord.

General Electric Co, Schenectady, N. Y.

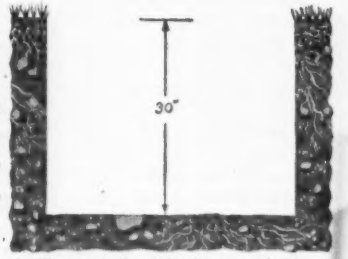
MORE NEW PRODUCTS
about which you should know

Jefferson Electric Co, Bellwood, Ill, has two types of 1000-w **mercury vapor transformers,** for H-12 and H-15 lamps, operating an 115, 230, 460v. Designed for high power factor, they provide three line matching voltage taps. . . . Polarod Electronics Corp, 100 Metropolitan Ave, Brooklyn 11, N. Y., has a direct reading **spectrum analyzer,** covering the 10-21,000 mc band by means of four tuning units. Uni-dial tuning gives 5 kc resolution at all frequencies.

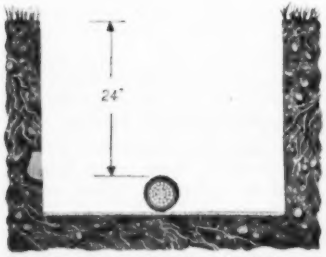
American-LaFrance-Foamite Corp, Elmira, N. Y., announces an **anti-static horn** for CO_2 fire extinguishers, in which static electricity is discharged to the cylinders by means of two copper strips molded in the horn. . . . Westinghouse Electric Corp, Hyde Park, Boston 36, Mass, has an **industrial fan** with either air handling, material handling or long shavings wheel; made in sizes from 670-44,000 cfm. and up to 16 in. water gauge pressure.

How to install buried cables in trenches

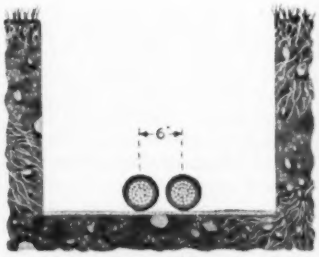
The most generally satisfactory way of installing buried cables is to lay them in a trench on a cushion of sand. There is less bending, distortion or tension than when a cable plow is used, a valuable factor if strains later occur through earth settling. The cable can also be protected by a treated plank or slab of concrete laid over it. Trenching permits the installation of cables at generally greater depths than does plowing. This greater depth makes cables less subject to damage by insects or rodents.



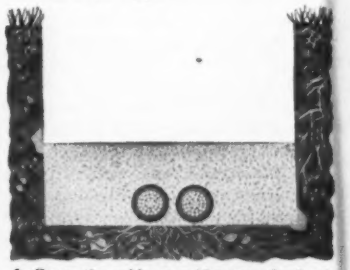
1. The trench should be deep enough (about 30") so that the cable, after providing the cushion mentioned below, will be at least 24" below the surface. This reduces the possibility of mechanical damage.



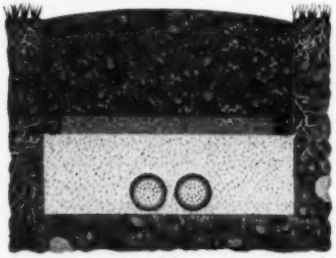
2. Put a cushion of sand on the bottom of the trench, or at least make sure the bottom is free of stones and other harmful debris. Lay cable with a slight snaking, to allow for earth settling and for expansion and contraction during load cycling.



3. When two or more cables are installed in the same trench, they should be spaced uniformly about 6" between centers so that the sand or earth can fill in around them. There must be no criss-crossing.



4. Cover the cable or cables to a depth of about 6" with sand or soft earth free from stones so that no rough edges will press against them.



5. Lay a concrete slab or creosote-treated plank on the sand or soft earth refill, to protect the cable and warn workmen of its presence. Complete the refill. Under highways, streets and rights-of-way, cables should always be installed in conduit.

Because of today's scarcity of rubber and copper, great care should be taken to see that your installations last as long as possible. With a few simple precautions, you can extend the life of your cables under normal operation. Although these precautions are well-known to many, we repeat them in the interest of getting maximum efficiency and long life out of our material and resources.

U.S.RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

Electrical Wire and Cable Department

ROCKEFELLER CENTER • NEW YORK 20, NEW YORK

LETTERS TO THE EDITOR

House Heating Argument Goes On

Viewpoint No. 3

To the Editor:

The two points of view on electrical house heating on Page 96 of the Aug. 25 issue were very interesting.

We feel that an electrical device that will give the ultimate user satisfactory, economical service will be eventually accepted. If it will not perform a service that is both satisfactory and economical, the best promotion will not secure its acceptance.

Our attitude is that electric heating is deluxe heating, but the customer must be informed as to its operating costs before he makes a decision. We give our prospective electric space heating customers such estimated costs of operation based on .43 kwhrs for each 1000 cu ft per degree day.

Too often the low initial cost influences the owner's or builder's decision. If economy of installation is the reason for the favorable decision, the customer usually cannot afford the operating cost.

The radiant heat aspect of these resistance panels is too often overemphasized. We have found that panels having a surface temperature of 300 F provide comfort level radiant temperatures on a black surface with low ambiant temperatures at a maximum distance of only two feet from the heater. All heaters, whether steam, hot water, fireplaces, etc, deliver comfort level radiant temperatures at various distances depending on the surface temperature of the heat source. The color of the receiver also has a bearing on the rate of absorption. It therefore resolves itself to the fact that electric radiant panel heaters are nothing more than gravity type convection heaters, and should be treated as such. There is nothing original or miraculous about electric radiant heaters since a wood fire was the first radiant heater.

We therefore feel that if the customer knows the true operating cost of the electric heating and still feels that he can afford it, fine. We do not want to bankrupt our customers. Neither do we want to bankrupt ourselves.

When our customers ask why the operating cost of electric resistance heat is so much higher than any other method, we inform them that the conversion efficiency of coal or oil to electricity is about 25%, while the conversion efficiency of coal or oil to heat in a conventional furnace in his own house is about 40% to 50%. The conversion efficiency of gas to heat is about 80%. When the cost of piping electricity from the power plants to the customer's premises is added, it is then clearly evident to the customer why the difference is so great.

Most people can understand this line of reasoning, while they do not understand the cost effect of electric heating loads on system peaks, nor the costly effect of poor seasonal load factor.

We admit that advantage can and should be taken of the low cost of electric panel heating for auxiliary space heating, or even the space heating of residences that are infrequently heated during winter months, such as summer cottages, because the cost under such conditions will still be a reasonable amount.

If a customer or builder can't get gas and doesn't want to heat with coal or oil, we recommend the electric heat pump. Its operating cost is competitive with fuel oil, and air cooling is secured in addition for summer use. We caution the customer to be sure, however, that plenty of well water is cheaply available at a rate of at least 1000 gallons per hour. The low cost availability of water in quantity is important to the satisfactory, economical operation of the heat pump. Ground coils have not proven satisfactory.

If the number of either electric heaters or heat pumps should become very great in any particular locality, we, like all other utilities will have some transmission and distribution problems, but haven't we always had such problems with the rapid growth that has been experienced in this industry? Before we complete one program of capacity expansion, we start planning on another program of expansion. That is a healthy condition.

New devices with their resulting increases in the load will always pose new problems. That is satisfactory progress. If there were no problems, there would be no need for executives or engineers.

C. J. Fuhrmann
Area Development
The Dayton Power and Light Co
Dayton, Ohio

Questions Viewpoint No. 2

To the Editor:

I refer to the two utility viewpoints on electric house heating disclosed in the August 25 issue of your magazine.

The first viewpoint appears reasonable. I agree with it.

The second seems unreasonable. It looks to be a calculated attempt to misinform and mislead the public and to discourage electric house heating. It unwisely denies to the public a desired service.

I question its assumption that 3.3¢ per kwhr is a fair, or defensible, rate for house heating load because:

1. This load is an integral part of the all-electric home, which is advocated by utilities and desired by the public.

2. This load is naturally—and may be controlled further to be—largely non-coincident with load peaks wherever in the system they may be considered—at the distribution transformer, the substation, or the power house. The viewpoint ignores the control factor.

3. This load has a power factor of unity and will avoid investment in power factor correction equipment.

4. This load occurs in cold weather when cables and distribution transformers and other outdoor equipment have maximum load capability, thus much reducing apprehension of increased investment in these facilities.

I question the validity of the second viewpoint on its comparison of efficiencies of heating with electricity, oil, and gas. For instance, efficiency of oil heating is stated as 65%, BTU delivered to living space over BTU of oil burned. Considering the manner in which the ordinary oil burner is operated and maintained, this efficiency is inordinately high.

The viewpoint fails to consider the associated costs of combustion heating in the way of cleaning, adjustments, repairs, and electricity for pumps, blowers, stokers, etc.

I question the statement that "the cost of initial installation of the various heating systems is about the same." The electric installation requires no chimney, no ducts, no furnace space; its initial cost is much less than that of the others.

Another inconsistency is the fact that all so-called radiant heating panels are controlled by thermostats that respond to ambient, not radiant, temperatures.

The utility should present a fair, unbiased picture of electric house heating to its customers. Only by such fairness can cooperation and good will be established for the utility, the manufacturer, and the "boss" of both —the public.

The first viewpoint indicates that at least some utilities—many, I believe—have taken a cooperative attitude and approach toward electric house heating. They have discovered that the primary market for it is the new small house, well-built and all-electric, with a diversified demand of 7½ to 10 kw or so.

William J. Canada
Engineering Consultant
Mountain Lakes, N. J.

A Matter of A Million

To the Editor:

I have been a subscriber to your magazine for several months and have enjoyed reading it for several years. I have seldom noticed errors in the text material, but there does seem to be an error, or omission, in the September 1 issue. On Page 8, column 1, line 4, the figure "$150.0" appears. Shouldn't this read "$150.0 million"? . . .

Edward T. Shea
Albert C. Wood Associates
1411 Walnut Street
Philadelphia 2, Pennsylvania

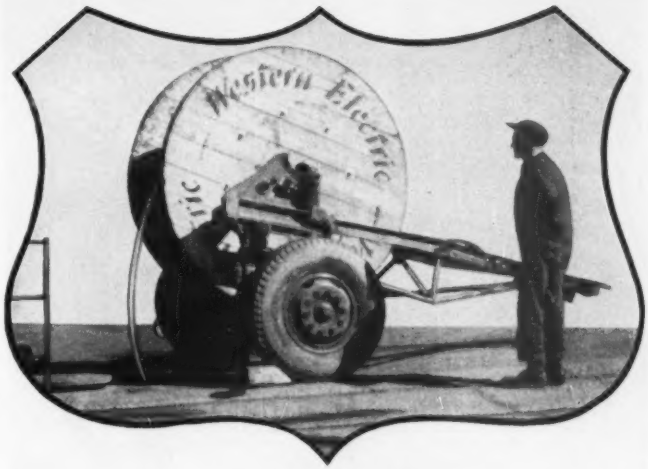
• It certainly should!

A Stew Over Oranges

To the Editor:

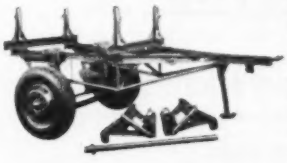
There is an error in the map on page 33 of your July 21 News Issue—that is to us Floridians. Who ever heard of a Louisiana orange?

R. W. Gillmore
1506 Riverside Avenue
Jacksonville, Fla.



HIGHWAY
Cable Reel Trailers
Quick loading - Easy riding

This is one model from the complete line of Highway Utility Trailer Equipment and accessories. It is used by utility companies all over the country for loading and transporting heavy and unwieldy reels of cable. It is quick and simple to load. Has a low center of gravity for safe transportation and braking at high speeds. There are two models with adjustable saddle guides to accommodate reels from 34″ to 48″ in width. Comes equipped with safety ropes and attaching parts. See your Highway representative for full information, or call or write for complete catalog.



COMBINATION POLE, CABLE REEL TRAILER

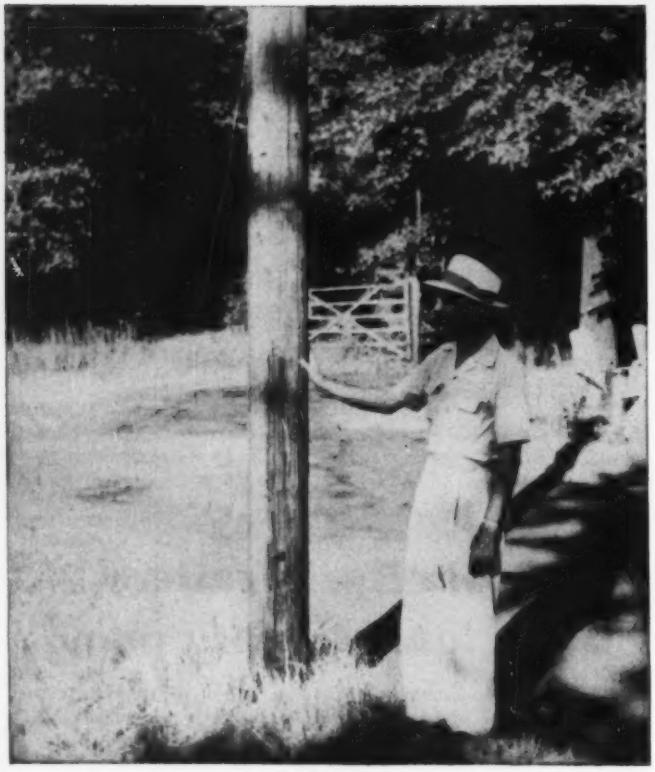
Quickly adjustable for either poles or cable reels. For poles, bolsters with sliding cam locking stanchions are easily mounted or unmounted. Cable reel saddles can be securely attached in a minute or two. Carries cable reels as effectively as standard cable reel trailer. Adjustable to different reel widths.

POLE TRAILER

This well-known Highway trailer has the strength to carry the occasional heavy load of poles while it is light in weight for economical carrying of average loads of poles. Load binding winch mounted on rear cross member, king pole binder on front cross member, 4 cam lock sliding stanchions make for safe transportation.

HIGHWAY TRAILER COMPANY

Headquarters: Edgerton, Wisconsin
PLANTS AT EDGERTON, WISCONSIN — STOUGHTON, WISCONSIN
Manufacturers of Utility Truck Bodies • Earth Boring Machines • Pole and Cable Reel Trailers • Winches • Power Take-offs • Service Accessories



KOPPERS POLE
"1914 Model"
still in service!

You can't blame the man for admiring this Koppers Pole. It was pressure-creosoted at the Koppers Grenada plant in 1914 . . . 38 years ago.

For such long-lasting service, and lowest cost per year, specify Koppers Pressure-Creosoted Poles. It's a buying practice that will show results in better operating records.

KOPPERS COMPANY, INC.
PITTSBURGH 19, PA.

KOPPERS **PRESSURE-CREOSOTED WOOD**

WHAT THEY'RE SAYING

At Industry Meetings

Where Are We Going?

Donald D. Hoover, president of Bozell & Jacobs Inc, before the Twenty-eighth Fall Conference of the Maryland Utilities Assoc at Virginia Beach, Va.

America's problem or perhaps its hope is that in the next four years the country will be back on the course of individual enterprise and honest prosperity regardless of who is elected president. Whether the new president will go hard right, a little right, down the middle or left is a great and serious conjecture which faces the nation and therefore which faces management of all industry.

Both Mr. Eisenhower and Mr. Stevenson have many things to say about electric generation and related matters and I have selected this industry because it is in the forefront of the battle against those who would nationalize large segments of industry. The Republican Platform favors greater local participation in the operation and control, and eventual local ownership, of federally sponsored, reimbursable water projects.

It vigorously opposes the efforts of this national administration, in California and elsewhere, to undermine State control over water use, to acquire paramount water rights without just compensation, and to establish all-powerful federal socialistic valley authorities. The Republicans are urging the further development of rural electrification and communications, with federally-assisted production of power and facilities for distribution when these are not adequately available through private enterprise at fair rates.

The Democrats have had this to say on rural electrification. Democratic administrations have established the great rural electrification program which has brought light and power to rural homes of our nation. In 1935, only 10 per cent of the farm homes of America had the benefits of electricity. Today 85 per cent of our rural homes enjoy the benefits of electric light and power.

Little is known of specific views of Mr. Eisenhower on the question of public vs private power. From the electric industry policy standpoint, however, I do not regard this with

alarm. The mere fact that he apparently has no preconceived notions indicates an open mind. I believe that his sense of fair play, as well as his objectivity toward the place of business in the economic picture, will lead him to consider both sides of the electric issue and then draw his own conclusions. Once the full story is presented to him and this is where management comes in, and in a big way, I feel that the facts about the business managed companies will speak for themselves.

Mr. Stevenson is, from the Administration standpoint, a moderate who may be being forced to a movement to the left. He believes in the autonomy of business, and the statements he has made publicly show a basic intellectual approach to problems, especially domestic ones.

Those who would socialize major segments of the American economy are constantly at work, spending huge sums of the taxpayers' money for propaganda to forward their aims. And don't forget, many of those will still be working in the government bureaus after next January. The utility industry will have to be hard at work, too, constantly informing the public. The basic reasonableness of the average American citizen and voter will prevail if he gets the facts.

Utilities must be positive in their stand, reasonable in their rates, and courageous from top to bottom in their personnel. And by example they will prove that free enterprise has, can and should continue to do the job of providing essential services which were developed through private capital and initiative.

Welcome Sign Is Out

WILLIAM V. KAHLER, President, Illinois Bell Telephone Co, before the Society of Women Engineers at Chicago, Ill.

There is a definite place for women engineers in industry and there is a definite need for their talents in shaping America's technological future. Some people, I am afraid there may even be engineers among them, still feel that women have only a limited place in the engineering profession. In my opinion this is mistaken thinking and not realistic in today's modern industry where we need to encourage engineering talents of creative nature wherever they may be, regardless of whether they belong to women or men.

"Plan Painting" with Subox Protects Metal, Eliminates Costly Repainting

During erection of new power stations or other industrial plants, construction dirt and dust make it virtually impossible to achieve the final decorative painting without several paint and repaint jobs.

This costly duplication can be avoided with Subox and Subalox paints and "Plan Painting" — the science of the right paints at the right time. Subox paints and this plan insure utmost protection yet reduce painting and repainting to the thriftiest minimum.

And where special metals become scarce and unavailable, Subox and Subalox paints increase the life of standard metals when applied according to plan during construction.

Subox paints can be used as primers, finishing coats or both. They can be applied over new, rusty or old surfaces, including galvanizing. They are superior protective paints because their basic pigment is suboxide of lead, and they are formulated by experts.

Available in a wide range for industry including every phase of the electrical industry.

TIME-TESTED FOR OVER 25 YEARS
The widespread acceptance of SUBOX and SUBALOX over a quarter century is evidence of superior performance in exacting usage. Subox specialists in protective painting have devoted a lifetime to perfection of the product.

Write today for your free copy of informative article on how to cut painting costs with "Plan Painting."

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NEWS ABOUT PEOPLE

ALVA B. BROWN CHARLES B. FROELICH CARROLL L. ELLIOTT

Alva B. Brown Is Elected . . .

. . . executive vice president and general manager of Southern Indiana G&E. Utility names Charles Froelich a VP

Alva B. Brown, vice president and operating manager of Southern Indiana Gas & Electric Co, has been appointed executive vice president and general manager and a director of the utility.

Charles B. Froelich, treasurer, has been elected a vice president and Carroll L. Elliott has been named general superintendent.

Began as Test Engineer . . . Brown has been in the utility industry since he was graduated from Montana State College in 1923 with a BS degree in electrical engineering. After graduation he joined Westinghouse Electric Corp as a student test engineer and the following year he went to Ohio Edison Co where he worked from 1924 to 1926 as a test engineer.

He left Ohio Edison to go with Southern Indiana G&E. In 1929 the original Ohio River steam electric generation station was completed, and Brown was selected to organize the operating crew and put the station into operation. He remained as chief engineer of the station until 1932 when he was appointed superintendent of production of plants and substations. In 1943 he became general superintendent in charge of gas and electric operations and in 1949 was elected vice president and operating manager.

A native of Evansville, Ind., Froelich joined Southern Indiana G&E in 1913. Elliott, who started his utility career in 1921, comes to the Indiana utility from Interstate Power Co, where he served as the personnel director since 1940. Before joining Interstate Power in 1939, he was associated with Northern States Power Co and Otter Tail Power Co.

•

Leonard A. Roberge, sales supervisor of Central Vermont Public Service Corp at Brattleboro, has been named appliance sales manager of the company. His successor is **Patrick H. Mangan, Jr.** Roberge, who started with Central Vermont in 1936, was named to the Brattleboro post in 1946. Mangan has been a salesman for Beech-Nut Packing Co for the last three and a half years.

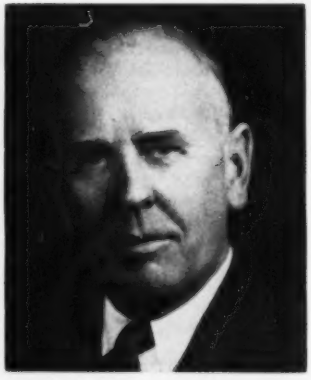
Herbert Strandberg will head Seattle City Light's newly created Engineering Division, assisted by supervising senior engineer **Hugh Silliman.** Creation of the division is the result of a merger by Seattle of its Transmission Project Engineering Division with the Design and Construction Engineering Division now that a transmission construction program nears completion.

Fred Henning has been appointed general sales manager of USCO Power Equipment Corp, switchgear manufacturer of Birmingham, Ala.

William J. Fleming has been appointed general manager of General Electric Co's lighting and rectifier department at Lynn, Mass. He succeeds Dr A. F. Dickerson, who has retired after 42 years with GE. Fleming, who started with the company in 1923, has been manager of engineering and manufacturing for GE's X-ray department for the past two years.

Dr Harry S. Dixon has been appointed chairman of the electrical engineering department of Newark (N. J.) College of Engineering. Dixon succeeds **Prof Albert A. Nims,** who retired recently after 34 years with the college. Before coming to Newark, the new chairman was associated with the University of California.

Dr Harold S. Osborne, formerly chief engineer of the American Telephone & Telegraph Co, has been elected president of the International Electrotechnical Commission. Dr Osborne is also president of the U. S. National Committee, an affiliate of the Electrical Standards Committee of the American Standards Association.

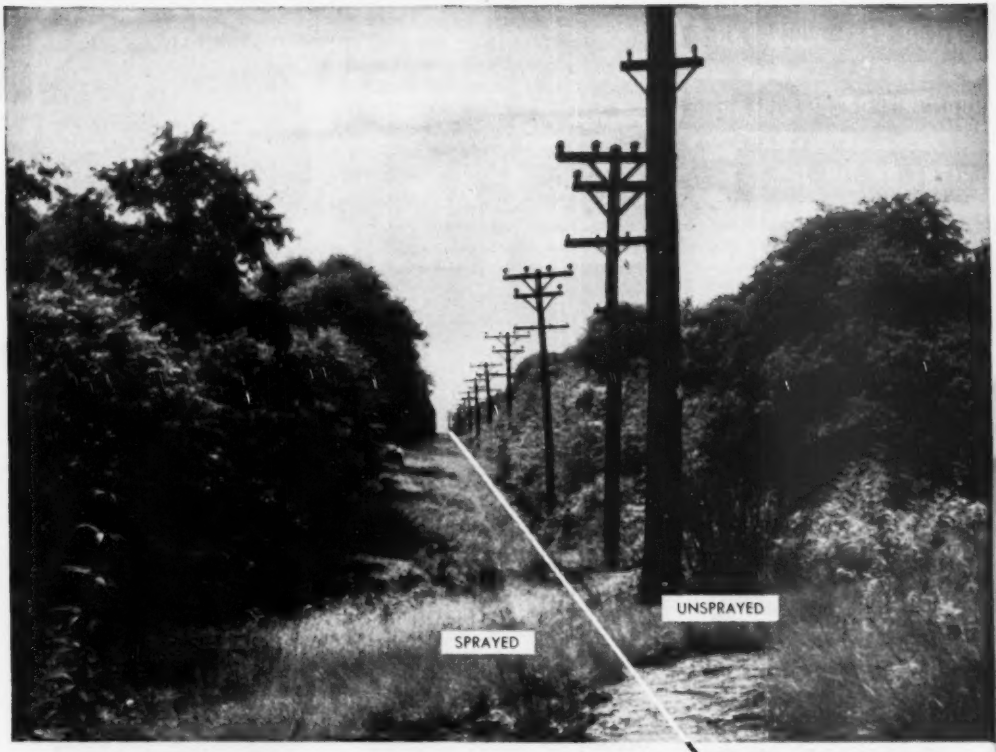


WILLIAM R. BELL

William R. Bell Promoted to New Post by NEES

William R. Bell, vice president of New England Power and Connecticut River Power companies since 1943, has been named principal officer of these wholesale subsidiaries of New England Electric System. He has been assigned the duties of Arthur E. LaCroix, executive vice president of the two companies who died Sept. 5 (EW Sept. 22, p 212).

Bell was graduated from Worcester



Brush control that's *right on the line!*

Brush control along thousands of miles of power and communication lines is a big job—one that calls for the best brush-killing chemicals available. Good results on many species of brush in all sections of the country at all seasons of the year have proved that Esteron* Brush Killer and Esteron 245 should be first choice in planning a successful brush control program.

Both contain the new, highly effective low-volatility propylene glycol butyl ether esters. Esteron Brush Killer, a mixture of the 2,4-D and 2,4,5-T esters, is widely used for control of mixed stands of brush. Esteron 245 gives poison ivy and other 2,4-D resistant woody species a straight dose of 2,4,5-T. This product also is recommended for year-around stump treatment and basal bark application. Both Esteron Brush Killer and Esteron 245 have excellent storage qualities.

For brush control that's *right on the line*—pick the right brush killer, use it right and at the right time. You are invited to call on Dow sales and technical men for consultation on your brush control problems.

*Esteron is a registered trade mark of The Dow Chemical Company, largest producers of weed, brush and grass control chemicals.

Esteron Brush Killer and Esteron 245

Containing new low-volatility esters

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DOW

CHEMICALS

INDISPENSABLE TO INDUSTRY AND AGRICULTURE

TAILOR-MAKE YOUR OWN

CONDUIT OR PIPE BENDS

RIGHT ON THE JOB

...simple, quick with the GREENLEE HYDRAULIC BENDER

Yes, quickly make bends *exactly* as you want them, when you want them, where you want them. Compact, portable Greenlee Hydraulic Pipe and Conduit Bender lets you do this in a jiffy. *One-man operated* to produce smooth, accurate bends in just a few minutes . . . in pipe up to 5", rigid and thin-wall conduit, tubing, bus-bars. Owners report timesavings up to 60% and more, elimination of cost for manufactured bends and fittings, and "clean", tailor-made installations every time. Get facts now on this time-saving tool that often pays for itself on first few jobs! Write for free Bender Booklet, Greenlee Tool Co., 1810 Columbia Avenue, Rockford, Illinois.

GREENLEE

Other GREENLEE timesaving tools for electrical work: Hand Benders; Joist Borers; Cable Pullers; Knockout Tools; Auger Bits and Drills.

Polytechnic Institute as an electrical engineer in 1910. After two years in the testing department of General Electric Co, he became an inspector for Power Construction Co. Closely identified with the development of New England power systems, he served for many years as an operating engineering executive.

EDWARD F. DISSMEYER

Ohio Edison Co Appoints Dissmeyer Chief Engineer

Ohio Edison Co has split its central engineering and construction department in two with the retirement of George E. Snider, who had headed the department. Snider had been with the company and its predecessors for more than 47 years. His former responsibilities have been divided between a department of engineering and a department of construction.

New Appointees . . . Edward F. Dissmeyer has been named chief engineer and Malcolm W. Smith head of the utility's production and transmission construction work.

Dissmeyer has had more than 25 years experience in public utility engineering. He has been an engineer with Commonwealth & Southern Corp, New York, and with Commonwealth Associates, Inc. Most recently he was general staff engineer, director, and treasurer of the latter firm in Jackson, Mich.

Smith, who has been associated with Ohio Edison and its predecessors for 27 years, has served as superintendent of production and transmission construction for the last five years. Pre-

DOUBLE-LIFE

WESTERN LARCH has many fine qualities that make it ideal for telephone and transmission pole use... high bending strength; high compressive strength; high shock resistance; unusual hardness; durability; long life and low service cost.

Western Larch is grown by J. Neils on virgin forest lands; produced and treated in the company's modern pole plant.

LARCH POLES

J. Neils Lumber Company, manufacturer of quality forest products since 1895, invites your inquiry on treated Western Larch poles. An illustrated folder about us, our pole facilities, and how we can serve your requirements, will be furnished on request.

Produced Treated Sold

POLE DIVISION
J. Neils Lumber Company
J N
Libby, Montana

Have you a fly ash recovery problem?

Bring it to
WESTERN PRECIPITATION

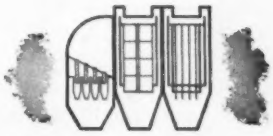
. . . The Only Organization With Years Of "Know-How" In BOTH *Electrical* And *Mechanical* Recovery Methods!

If you have any kind of a suspension-recovery problem—whether dust, fly ash, fume, fog or mists—it will pay you to bring it to the leading organization in the field . . . WESTERN PRECIPITATION CORPORATION. Western Precipitation not only pioneered, over 44 years ago, the first commercial application of the now-famous COTTRELL Electrical Precipitators, but also has been a leader for many years in the *mechanical* recovery field with its widely-accepted MULTICLONE Collectors.

Result:

Western Precipitation is unsurpassed in the all-important factor of "know-how" in BOTH the electrical and mechanical fields . . . knows from years of first-hand experience whether your particular problem can best be solved by mechanical or electrical methods—*or by a combination of the two* . . . can give you a direct and unbiased recommendation on the matter . . . and then can provide the complete installation under *one* responsibility, *one* overall performance guarantee, even where Combination Multiclone-Precipitator (CMP) installations are made!

Western Precipitation products and services include . . .



COTTRELL
Electrical Precipitators

. . . the most efficient recovery equipment for high recovery, long life, low maintenance on practically any type of suspensions, wet or dry. COTTRELLS can be designed to handle a few c.f.m. —or millions—with equal ease, and at virtually any operating temperature. Recovery efficiencies closely approach 100% recovery, if desired, with very low draft loss, minimum power costs and negligible labor costs. *By all standards, Western Precipitation* COTTRELLS *give highest recovery at lowest cost per-year-of-service!*

MULTICLONE
Mechanical Collectors

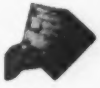
. . . the most efficient, most compact, most trouble-free mechanical equipment for recovering suspensions from gases. Because of their unique small-tube design, MULTICLONES are unsurpassed in mechanical recovery efficiencies—require less space, less maintenance, and are far simpler to install. No filters or screens to replace, nothing to burn or cause fire hazards, no high speed moving parts to repair or replace. These and many other advantages make MULTICLONE Collectors the logical choice on installations where mechanical recovery is selected.

CMP UNITS
(Combination Multiclone-Precipitator)

. . . combine, in *one* compact installation, *both* mechanical and electrical recovery principles so that maximum benefit is obtained from the advantages inherent in each method. The MULTICLONE section centrifugally removes the larger and heavier suspensions (down to a few microns in diameter) . . . and the COTTRELL section then electrically removes the very small particles remaining in the gases. Thus, the bulk of the recovery is obtained with relatively low-cost equipment, and the final clean-up is obtained with equipment having unusually high recovery efficiency—approaching theoretically perfect, if desired.

The recovery of suspensions from gases is a highly exact science and every problem is different. Some require mechanical methods—others electrical methods—still others a combination of mechanical and electrical methods in proper balance to meet the individual requirements of each application. No matter what your problem, remember that only Western Precipitation has had years of field experience in BOTH mechanical and electrical methods!

Send for descriptive literature!



Let our experienced engineers study your recovery requirements and make an unbiased recommendation on the equipment best suited to your particular problem. A wire, phone call or letter to our nearest office places this unique "know-how" at your service, without obligation.

WESTERN Precipitation CORPORATION

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

Main Offices: 1004 WEST NINTH STREET, LOS ANGELES 15, CALIF.
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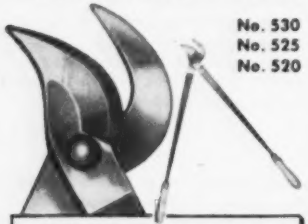
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

MULTICLONE—T. M. Reg.

NEW SEYMOUR SMITH TIFFANY PRUNER

Now two great names combine in the world's finest long handled pruner.



No. 530
No. 525
No. 520

The **TIFFANY** double cut, efficient "draw-in" cutting action and 100% hammer forged alloy steel parts **PLUS** the **Seymour Smith** improved bolt and nut joint, through handle and riveted grip fastening and thinner cutting edges.

3 SIZES: 30" ($5.75) 25" ($5.50) 20" ($5.25)

"TELEPHONE" TREE PRUNERS

Reinforced malleable iron head. Tempered steel blade. Compression coil spring. Spruce poles with telescoping ferrule joints. Cable chain works through ball bearing pulley. Cuts up to 1".

No. 11-18. Complete pruner with rope and 18' pole $16.00
No. 11 (Pruner Head only) $4.20
Prices for No. 12 Head (for 1½" cutting) and extensions on request.

PROFESSIONAL PRUNER

No. 124 8" $3.75 No. 125 9" $4.25

The standard "Double-Cut" pruner for the expert. Also, the finest of them all, No. 90, 8". $4.75.

NEW, FINEST EVER
PRUNING SAWS

No. 922 22" blade $4.60

No. 514 14" blade $2.75

A new Seymour Smith development, with blades of finest Swedish steel. Fastest, easiest cutters on the market. Complete line of 6 models covering all requirements up to chain saw work.

SEYMOUR SMITH
OUR 102nd YEAR

Prices slightly higher Denver and West

See your dealer — or write for free, descriptive literature.

Seymour Smith & Son, Inc., 22410 Main St., Oakville, Conn.

MALCOLM W. SMITH

viously he was chief electrician of the company's Toronto plant and superintendent of electrical construction.

Former VP . . . Snider has served Ohio power companies throughout his career. Formerly associated with Toledo Railways & Light Co, he joined Ohio Public Service Co in 1922 as chief engineer. In 1944 he was elected a director and vice president in charge of operations with supervision over all of Ohio PS's production, transmission, and distribution facilities. In 1950, with the merger of Ohio PS and Ohio Edison, he became chief engineer.

•

Luther D. Shank, retiring director of the Electrical Division of National Production Authority, has been appointed assistant to the vice president and general sales manager of National Electric Products Corp. In addition to his duties as assistant, he also will be in charge of Pittsburgh district sales.

C. P. Boggs has been named to the newly created post of vice president in charge of manufacturing for Brush Development Co. Formerly vice president of manufacturing for Sylvania Electric Products, Inc, Boggs will direct all manufacturing activities.

John O. Gunn has been named director of public relations at Cleveland Electric Illuminating Co to succeed **George Z. Griswold,** who has resigned. Gunn was associated with the Newspaper Enterprise Association before joining CEI three years ago.

(*Continued on page* 177)

YOUR GUARDS ARE DOWN!

DO AWAY WITH GUY GUARD TROUBLES LIKE THIS . . .

SPECIFY *Flexibal*

THE GUARD THAT CAN'T GO WRONG!

COSTS ⅓ LESS THAN METAL GUARDS—AND ***NO MAINTENANCE PROBLEM***

FLEXIBAL Guy Guards — in standard lengths — provide the flexibility that gives with the blow and cushions the impact. Aluminum-painted, they offer both day and night visibility. No other type of guard is so easy to handle, so simple to install — none so effectively cut down losses — never gets out of commission.

USED AND PRAISED BY CONSTANTLY GROWING LIST OF UTILITIES

R.E.A. APPROVED

Write for Free Sample and Prices

IMMEDIATE DELIVERY

TEN COMPLETE SETS IN THIS ONE LIGHT EASY TO HANDLE CARTON

SEE YOUR JOBBER OR WRITE TO
S. E. OVERTON COMPANY
SOUTH HAVEN, MICHIGAN

High-voltage capacitors now assembled in completely wired, factory-assembled stacking units

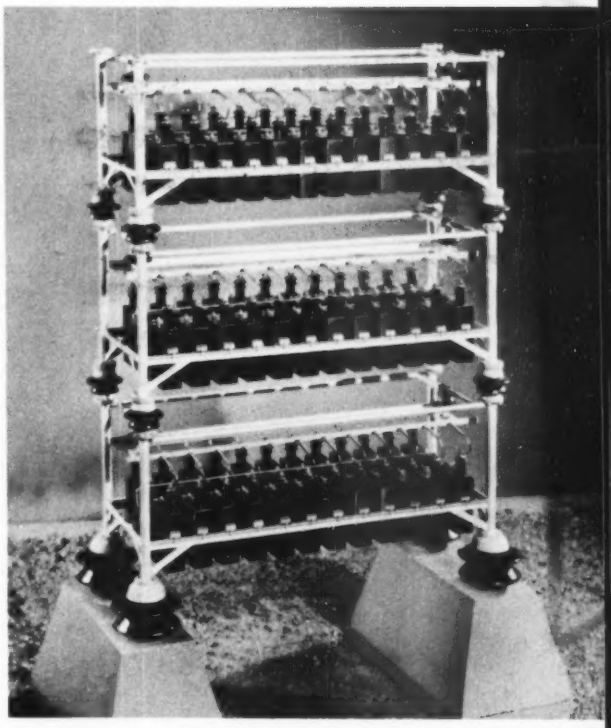
INSTALLED COST GREATLY REDUCED

The use of capacitors has long been accepted as the most economical means of improving voltage conditions and increasing circuit capacities. Now, Westinghouse offers a line of *standardized factory-assembled* capacitor stacking units from which can be selected the appropriate combination to achieve desired KVAR and voltage ratings. The result is a minimum of installation labor and expense.

The new outdoor capacitor stacking units can be arranged for service from 2,400 to 287,000 volts, through groups of standard rating units connected in series between line and neutral. The capacity will depend on the number of units in parallel per group. Unit construction provides the important advantages of low-cost installation, plus easy reconversion for other voltages . . . and you can stack them up to four units high.

Long maintenance-free life of the complete unit is assured by hot-dip galvanizing of the steel framework *after assembly*. The zinc-spray finish of the capacitor units eliminates any need for periodic painting.

For complete information, write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.



Typical Westinghouse high-voltage capacitor bank. Each of the three stacking units is completely assembled and wired, and shipped ready for installation.

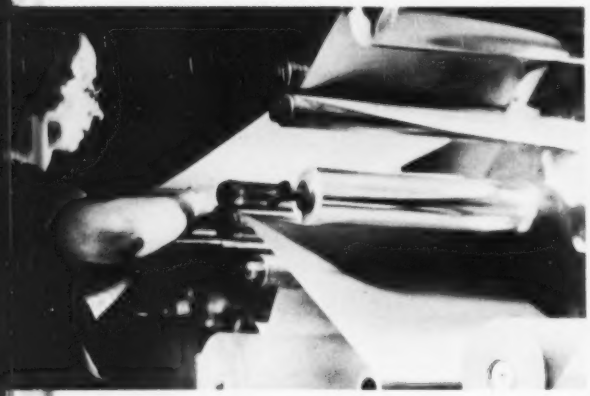
YOU CAN BE SURE... IF IT'S

Westinghouse

INERTEEN CAPACITORS

Better service, greater savings . . . result from these design and construction features

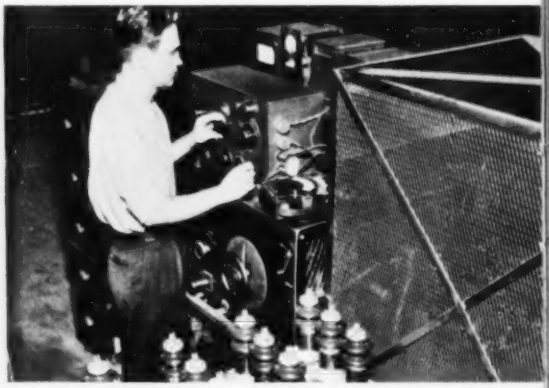
The steady reduction in Westinghouse capacitor price is supplemented by the large savings realized from lower installation and maintenance costs. Westinghouse Inerteen* Capacitors have compiled an enviable record of long-life, trouble-free service. These features are typical of the way Westinghouse engineering keeps your costs low.



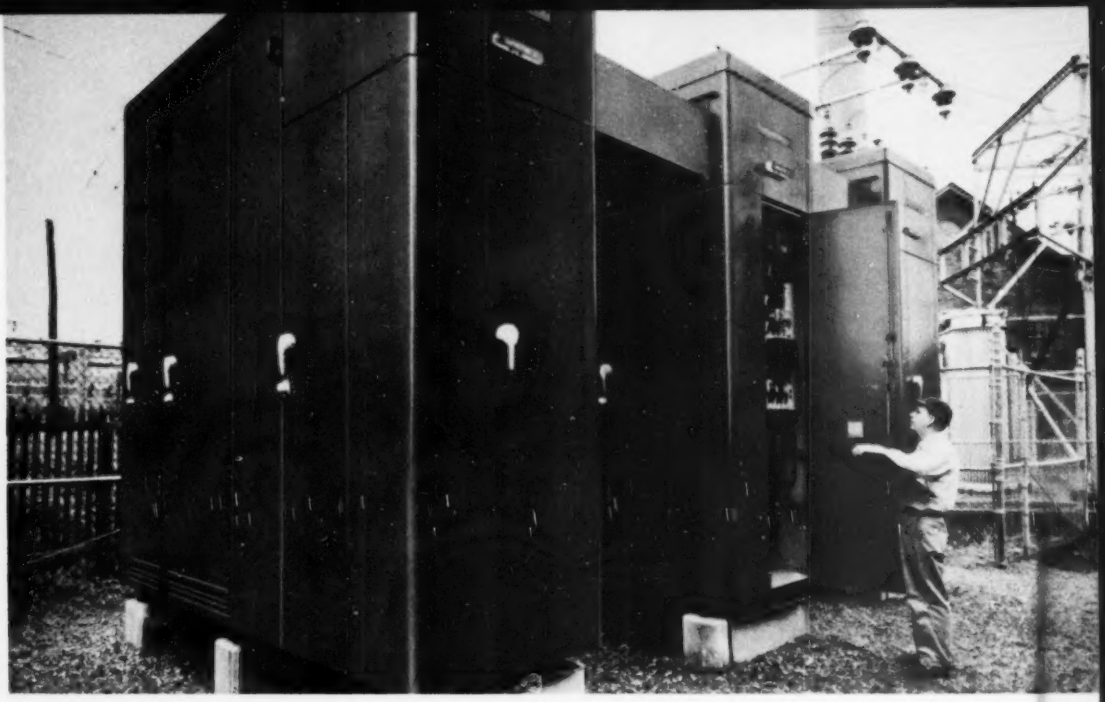
Inertex paper dielectric—Inertex is a special Westinghouse capacitor paper of highly purified wood cellulose. It is rigidly inspected for conducting particles, and physical, chemical and electrical characteristics. Non-inflammable Inerteen is used for impregnation.

Hermetically-sealed units—Solder-sealed terminal bushings eliminate compression gaskets, give positive protection against leaks or contamination of the dielectric assembly.

Zinc-spray finish—A tough zinc coating, many times the thickness of normal hot-dip galvanizing, gives effective protection against rust and atmospheric corrosion, provides strong resistance to abrasion.



Testing—All known operating conditions are included in performance tests given to every Inerteen Capacitor. Electrical tests assure losses of not more than ⅓ of 1% . . . full kvar at rated voltage and frequency. Pressure tests insure leakproof construction.



For system voltage control from large substation banks . . . Westinghouse completely enclosed capacitor equipments

Westinghouse metal-enclosed capacitor equipments are used primarily in large substation banks to control voltage levels and reactive power flow over whole systems. This 13.8-kv 3-phase unit includes capacitors, circuit breakers and grounding switches for complete automatic or manual control. Available in a voltage range of 230 to 34,500 volts. They offer these built-in time and money-saving advantages:

Factory-assembled enclosures—Low installation costs follow from simple foundation requirements, easy connections.

Completely self-contained—Up to 13.8 kv, they are integral operating units, and require *no* external accessories.

Complete safety—Safety to personnel and equipment is assured by fully interlocked system of grounding control. Completely encased in steel.

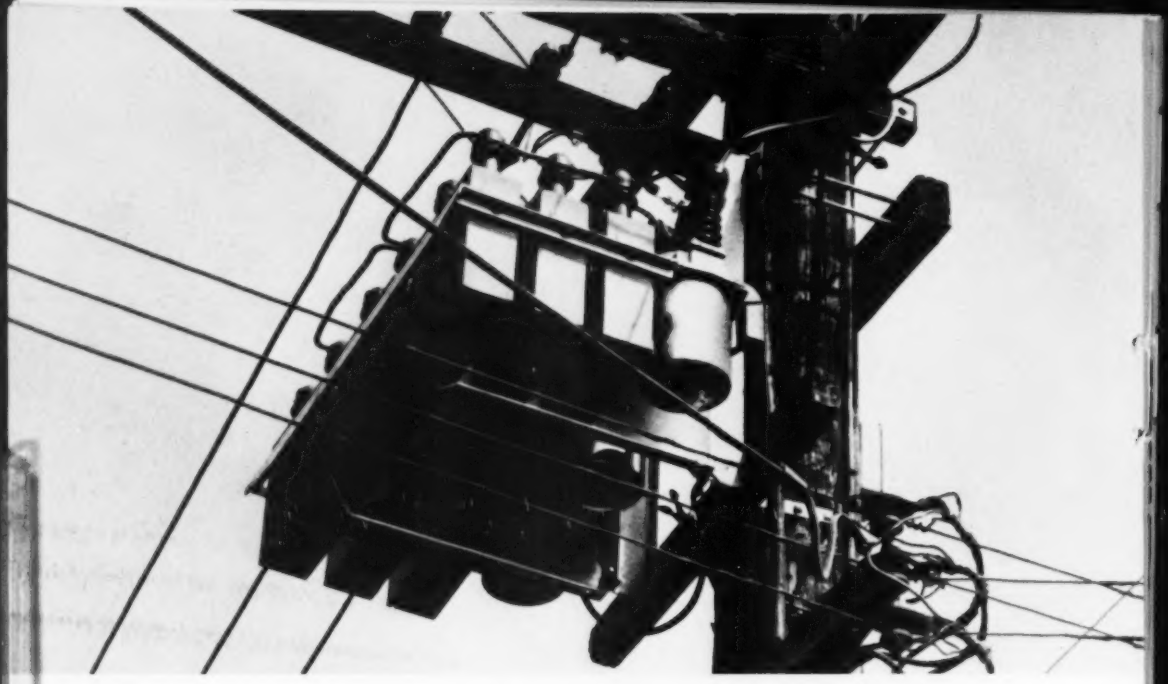
Compact structure—Minimum floor space required.

Wide flexibility—Roof bushings, throat, or pothead connections provide for easy installation. Easily moved to new location.

•

Westinghouse Enclosed Capacitor Equipments are available with automatic control, where operating conditions require. For more information on how you can increase pay loads with Westinghouse capacitors, contact your local representative, or write for Booklet D.B. 49-220. Address: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

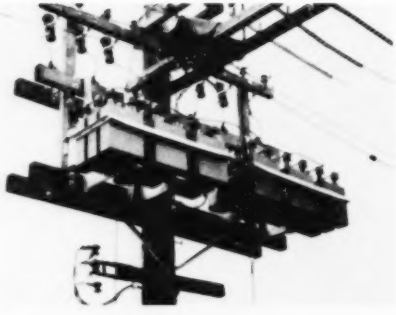
YOU CAN BE **SURE**...IF IT'S Westinghouse



Automatically switched Autotrol* brings low-cost capacitor equipment to distribution circuits

Westinghouse Open-Type Autotrol turns power-factor losses into profitable pay-load capacity . . . at a cost as low as $5.66 per kvar. Compact, lightweight Autotrol units are completely factory assembled and wired . . . installation is simple and inexpensive. You just hoist, bolt and connect! Available for 225 and 300 kvar, Autotrol answers your need for "on-the-spot" switched power-factor improvement at any point on your distribution system.

Your Westinghouse representative has more complete information on the savings you can effect. Or write for Booklet D.B. 49-310. Address: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-60796



YOU CAN BE SURE...IF IT'S
Westinghouse

INERTEEN CAPACITORS

*Trade-mark

OBITUARY

George A. Mills, 67, retired superintendent of Central Power & Light Co, died at Dixon, Ill., Sept. 17. Mills came to Central P&L's Corpus Christi (Tex.) office in 1939, retiring in 1951. Before accepting this post he had been president for Kansas Electric Power Co and Missouri Gas & Electric Service Co after serving as vice president for both utilities. He was chief engineer of Central & Southwest Utilities Corp from 1926 to 1932.

Leonard T. Blaisdell, 65, former commercial vice president of General Electric Co, died recently at Dallas, Tex. Blaisdell, who joined GE in 1904, was named commercial vice president for the compnay's apparatus department in the Southwest district in 1936 with headquarters at Dallas and was appointed to a similar position in 1939 in the East Central district at Cleveland. In 1945 he was made commercial vice president for the entire company, retiring in 1950.

Joseph F. Gunzelman, 79, manager of the Lands and Buildings Division of Dayton Power & Light Co, died Sept. 17. Gunzelman, who joined Dayton P&L in 1913, was appointed manager in 1937.

W. Howard Barney, former vice president and general manager of Collyer Insulated Wire Co, died at Warwick, R. I., Sept. 16. He retired in 1949 after 25 years' service with the firm.

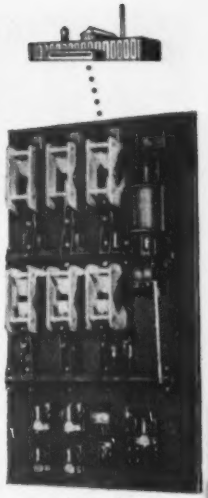
Albert Coles, 65, superintendent of power for Saskatchewan Power Corp, Regina, Sask., died Sept. 10.

Barry Wilson, chief engineer and general manager of St. John district of New Brunswick Electric Power Commission, died Sept. 15 at St. John, N. B He had filled the commission posts since 1932.

Herald F. Sample, 52, an installation engineer for General Electric Co for 35 years, died Sept. 20 at Albany, N. Y. He was in Albany to supervise installation of power turbines at a new power station there.

John J. Daly, 54, retail sales manager for Connecticut Light & Power Co since 1946, died at Waterbury, Conn., Sept. 15.

HEADQUARTERS FOR
AUTOMATIC TRANSFER SWITCHES



Specialized electromagnetic controls are our business and Automatic Transfer Switches are vital specialized controls. All we want to do is to make the best, the most durable, and the most reliable specialized controls humanly possible.

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Asco Automatic Transfer Switches Feature:

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Reserve your free copy of the new booklet "Automatic Transfer Switches" now ready for publication. The booklet discusses such important features as close differential voltage supervision, arrangements to ignore momentary outages, and other factual information you'll want for reference.

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900 Ampere size—narrow panel, important in Distribution Control Centers.

We also manufacture a complete line of Solenoid Operated Valves for Automatic and Remote Control of Liquids and Gases.

B-12.3A

ASCO Electro-Magnetic CONTROLS

Automatic Switch Co.
397 LAKESIDE AVENUE · ORANGE, NEW JERSEY

GE Uses Cond-Al in Joppa Unit

Aluminum alloy utilized in firm's largest turbine generator. New Jersey station to get 1,100 F turbine

General Electric Co has shipped what is reported to be the largest turbine-generator of its type ever built to the Joppa (Ill.) Plant of Electric Energy, Inc. and has also started production of a turbine which will operate with the highest steam temperature (1,100 F) ever used in a turbine-generator unit.

Joppa Unit . . . With a maximum capability of 216,000 kva, the generator is the first designed to use the new alloy, Cond-Al, whose development was announced recently (EW, Sept. 8, p 176). It operates at 3,600 rpm.

The complete Joppa unit is one of four GE turbine generators on order for Joppa Plant, which will supply power to the Paducah, Ky., project of the Atomic Energy Commission now under construction. Three similar units are scheduled for delivery by early 1953.

When assembled, each turbine-generator set will be nearly 82 ft long, 17 ft wide, and more than 10 ft above floor level. Because of shipping limitations, the generator stators are subdivided into inner and outer frames, the inner frame containing the core and coils and the outer frame being further split into three sections.

Welded at Destination . . . These sections are shipped separately and bolted and welded together at the destination. The inner frame is then slipped into position and mounted on supporting members.

The Joppa power plant of Electric Energy is just across the Ohio River from Paducah. When the four units are in operation, it will have a capacity of 625,000 kw. Indications are that the station will eventually have even larger generating capacity.

Highest Steam Temperature . . . GE's new turbine, operating at an initial temperature of 1,100 F, will be used at the Kearny Station of Public Service Electric & Gas Co. The 145,000-kw unit is the first of two the New Jersey company soon will place in operation.

This unit is one of the first 3,600-rpm machines generating at 20,000 v. Another feature is that the boiler will employ coal, oil, or gas, or a combination of three as fuel. Steam will be used at a pressure of approximately 2,350 lb psi.

Stainless Steel Used . . . Among other special design features of the Kearny unit is the use in the inner shells of stainless steel, which is necessary because of the high temperature.

Previous highest temperature used in steam turbine generators was 1,050 F. The first machine using this temperature was installed at the Sewaren Plant of Public Service E&G in 1948.

Nash-Kelvinator Buys Laundry Equipment Firm

Nash-Kelvinator Corp, Detroit, has purchased the controlling interest in the Altorfer Bros Co, Peoria, Ill., manufacturers of ABC laundry equipment.

While plans have not been completed, George W. Mason, president and chairman of Nash-Kelvinator, said present intention is to operate the Altorfer company as a subsidiary under its present management. He added that present plans call for the continuation of the ABC line produced in the Peoria plant and a new line of Kelvinator laundry equipment.

The Altorfer firm was founded in 1909 in Roanoke, Ill., as a partnership of Henry Altorfer and his sons. The present corporation was organized in 1916.

Transformer Prices Rise

Increased costs of steel, copper, and aluminum have caused Westinghouse Electric Corp's Transformer Division to announce a 1.3% increase in prices of its products. Division officials said the price increase has been authorized by OPS Regulation GOR-35, which stipulates that recently increased costs of steel, copper, and aluminum may be added to the manufacturer's prices. This change does not reflect any increase in labor or other operating costs, it was pointed out by Westinghouse officials.

Completes New Plant

Moloney Electric Co, St. Louis, has completed a new transformer plant addition adjacent to its existing plant. The new, one-story steel-framed structure provides 19,200 sq ft of manufacturing area and 10,800 sq ft of materials handling area. The building, over 80 ft wide and 240 ft long with an eave height of 26 ft, is designed to handle two five-ton bridge cranes and has an open runway extension for one crane that is 240 ft long. An area between the new addition and the present plant has been left open for future expansion.

Opens New Warehouse

Bridgeport Brass Co has opened a new warehouse in Philadelphia because of the increasing demand for brass and copper mill products caused by industrial expansion in the Middle Atlantic area. In announcing the opening, Chester M. Adams, general sales manager, said the Philadelphia warehouse was built especially for carrying large stocks of brass and copper strip, rod, wire, and tube products. The building, located at 918 East Lycoming Street, also has offices for warehouse staff.

MANUFACTURING BRIEFS

Sylvania Electric, Ltd, Canada, a wholly owned subsidiary of Sylvania Electric Products Inc, has started construction of a one-story plant at Drummondville, Ont. The plant, scheduled to go into production soon after the year-end, will employ about 100 to make electronic devices.

Wagner Electric Corp, St. Louis, has purchased from Fulton Iron Works Co a portion of its property adjoining the Wagner main plant. The property, which will be used to increase the firm's transformer manufacturing capacity, consists of about three acres

of land with four buildings having a combined floor area of more than 100,000 sq ft. It is estimated the expansion program will require at least one year and will cost more than a million dollars.

General Electric Co has broken ground at Philadelphia for its $1,690,000 service shop and warehouse. Scheduled to go into operation in August, 1953, the 130,000 sq ft, one-floor structure will be set up to handle all major transportation, utility, and industrial apparatus.

Kuhlman Electric Co, Bay City, Mich., has announced the purchase of the assets of Queensboro Transformer & Machinery Co, Crystal Springs, Miss., and lease of a transformer manufacturing plant under construction at Crystal Springs. The new plant is expected to be completed in the near future. The Crystal Springs property will be operated as a branch plant, and headquarters of the company will remain at Bay City.

Fairbanks, Morse & Co, Chicago, has received a $7-million order for electric motors from the Atomic Energy Commission. The motors, which will be built at the Beloit (Wis.) Works, will range up to 2,000 hp.

SALES ASSIGNMENTS

COMPANY STAFFS

Graybar Electric Co, New York, has appointed J. M. Turner operating manager at Jackson, Miss. Turner joined Graybar in 1946 and has served as operating manager at Beaumont, Tex.

BullDog Electric Products Co, Detroit, has assigned Joseph A. McGonegle to its Cincinnati district sales force. McGonegle, formerly with General Electric Supply Corp, will concentrate on merchandising work under the district manager.

Taller & Cooper, Inc, Brooklyn, has appointed Louis E. Walz, Jr, as engineering representative. He formerly was on the sales engineering staff of Leeds & Northrup Co, Philadelphia.

Libbey-Owens-Ford Glass Co has appointed C. Frederick Moore as field sales representative of Fiber Glass Division with headquarters at 1528 Walnut Street, Philadelphia. For the last two years, Moore has been with Westinghouse Electric Corp.

Reliance Electric & Engineering Co, Cleveland, has assigned William F. Kiser, Jr, as a sales application engineer in its Philadelphia district sales office at 19 East Lancaster Ave., Ardmore, Pa. Kiser joined Reliance in 1950.

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MEMO

Don't Say It — Write It

Miss M—
Make no appointments for me Dec. 1-6. I'll be attending the National Power Show in New York. That Harrison deal can wait, and so can anything else. Seeing the Power Show is always a must.
P.S. Expect to take Joe and Bill along.
J.B.

Anyone concerned with steam, electric, or mechanical power problems can benefit greatly by attending this outstanding Exposition. Concentrated here will be interesting displays and informative demonstrations on . . .

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will be represented by technical men on hand to show you the latest equipment, materials, and methods for power production, distribution and use, and to help solve your present problems and future requirements. Yes, a wealth of NEW IDEAS awaits you at the

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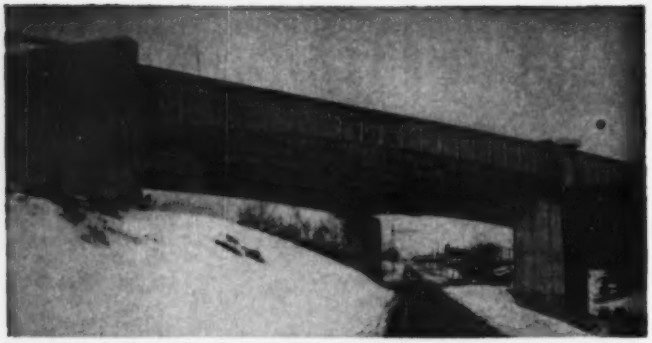

Bridge on Wilbur Cross Parkway, Conn. Fabricated by Electric Boat

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New Electrical Construction

New electrical construction projects announced by private and government utility systems involving more than $70,000. Also listed are major industrial and construction jobs where electrical work is included.

UTILITIES

Proposed Construction

Fla., Key West—Key West Utility Bd., Key West, electric sub-stations.

Idaho—U. S. Eng., 4735 E. Marginal Way, Seattle, 4, Wash., 182,00 lin. ft. wire and cable for lighting, power, control and telephone circuits at Albeni Falls dam, Inv. 53-18.

Me., Rumford—Rumford Falls Power Co., 49 Congress St., Philip Thomas, ch. engr., Rumford, re-development of hydro-electric failities, generating plant, two 6,400 kilowatt hydro-electric units, $2,-000,000, Charles T. Main, Inc., 80 Federal St., Boston, Mass., consult. engrs.

Mass., Canton—State Dpt. P. Welfare, 600 Washington St., C-401, power plant imprvs., Hospital School. $75,000. Hubbard, Lawless & Balkeley, 177 State St., Boston, engrs.

Mich., Crystal Falls—City, Municipal Electric Dpt., plans by Holland Ackerman & Holland, 20 N. Wacker Dr., Chicago, Ill., hydro-electric power plant imprvs., alterations, switchboard equipment, power generator, turbine engine, $200,000.

Minn., St. Paul—Graybar Electric Co., 824 S. 4 St., Minneapolis, plans by Ellerbe & Co., E. 505 First National Bank Bldg., warehouse, W. Minnehaha and Prior Aves. $150,000.

Mo., Kansas City—Mid-Central Fish Co., c/o Ralph Carr, treas., 1656 Washington St., refrigeration bldg., addns., alterations, $400,000. Emile O. Bayerl, 20 W. 9 St., Kansas City, Mo., archt., Pfuhl & Shidler, Finance Bldg., Kansas City, Mo., struct. engrs., Wm. L. Cassell, 912 Baltimore St., Kansas City, Mo., mech. engr.

Nebraska—Howard-Greeley Rural Public Power Dist., St. Paul, rural distr. lines, Howard and Greeley Counties. $600,000. H. S. Nixon Eng. Co., W O W Bldg., Omaha, consult. engr.

N. Y., Mt. Pleasant—General Electric Co., 570 Lexington Ave., New York, Zone 22, headquarters office on 186-acre tract. $5,000,000.

O., Eastlake—Cleveland Electric Illuminating Co., Public Square, Cleveland, addnl. containing one 200,000-kilowatt turbogenerator to $60,000,000 power plant already under const. $25,000,000.

O., Marion—U. S. Eng., 237 Fourth Ave., Huntington 18, W. Va., 34.5 KV substation and 13.2 KV feeders at Marion Engineer Depot, Serial No. ENG 46-022-53.11.

Texas—U. S. Eng., Box 61, Tulsa 2, Okla., expans. of Denison Red River Dam power house by 35,000 kw; new unit will be adjacent to existing power house, making a grand total of 105,000-kw. $6,500,-000.

Washington—Bonneville Power Admin., 827 N.E. Oregon St., Portland, Ore., constr. 115 kv shunt capacitor bank, Shelton sub-station Mason Co., Inv. 6720. Plans deposit $25. L. C. Stewart, 827 N.E. Oregon St., Portland, Ore., engr.

Ont., Port Union—Canadian General Electric Co. Ltd., 212 King St. W., Toronto, factory, $1,000,000. Margison & Babcock, 119 Isabella St., Toronto, consult. engrs.

Low Bidders & Contracts Awarded

Indiana—De Long Constr. Co., Box 463, Girard, Ill. CA $84,677, 6.4 mi. rural distr. line and sys. imprvs. Wayne Co. Wayne County Rural Electric Membership Corp., Richmond, Ind. Chanaberry Eng. Co., 801 Realty Bldg., Louisville, Ky., engr.

Kentucky—A. A. Electric Co., 2125 S. 60 Court St., Cicero 50, Ill. CA $309,270. 239 mi. rural distr. lines, sys. imprvs., Warren Co., Warren Rural Electric Co-operative Corp., Bowling Green, Ky. Chanaberry Eng. Co., 301 Realty Bldg., Louisville, Ky., engr.

Alabama—Griffin Key Constr. Co., 1500 S. Hull St., Montgomery 6, Ala. CA $110,775. sub-station, facilities, 16.5 mi. rural distr. lines, Barbour Co. Pea River Electric Co-operative, P.O. Box 211, Ozark, Ala. J. F. Bevis Co., Gadsden, Ala., engr.

Fla., Leesburg—Leesburg Freezing Corp., Leesburg, Fla. Owner Builds. Approx. $2,000,000. 3 m. cu. ft. freezing plant and cold storage warehouse and office. Awarded Sept. 11.

Ill., Great Lakes—Sumner S. Sollitt Co., 307 N. Michigan Ave., Chicago, 1, Ill., CA $3,770,000, electronics supply office bldg.,

Md., Annapolis—Trueland Electric Co., 1715 Leighway St., Arlington, Va. LB $627,750. electric distr. sys., ring sys., manholes, substation, transformers stations, street lighting, U. S. Naval Engineering Experiment Station, Spec. 31661. P. Wks. Officer, U. S. Naval Academy, Annapolis, Md. Bids Aug. 28.

Mo., Kansas City—Ebasco Services, Inc., 2 Rector St., New York, N. Y. CA, design and construct, Hawthorne station addn.; Westinghouse Electric Corp., Union Bank Bldg., Pittsburgh, Pa. CA, 100,000 kw turbo generators, Total est. $15,200,000. Kansas City Power & Light Co., 1330 Baltimore St., Kansas City 10, Mo.

Nebraska—Douglas Contractors, 224 Keeline Bldg., Omaha, Neb., CA $136,467. 24.1 mi. new distr. lines and conversion of 47.28 mi. Antelope, Holt and Knox counties. North Central Rural Public Power Dist., Creighton, Neb. Bids Sept. 11.

South Dakota—Bloedow & Klabunde, Clements, Minn., LB. $156,199, rural distr. lines, Lincoln Co. Lincoln Union Electric Co-operative, Canton, S. D. Bids Sept. 3.

Texas, Roma—Westinghouse Electric Corp., Mills Bldg., El Paso, Tex. CA. $101,624. Schedules 5, 6, 7, 8 and 9, twelve current and three potential transformers, one 3,000/3,750 kwa unit substation, one 130-kva step-voltage regulator and three current-limiting reactors for Falcon switchyards, Falcon Dam and Power Plant. Spec. D-4646 (IBWC) Bureau Reclamation, Dpt. Interior, Bldg. 1-A, Denver Federal Center, Denver, Colo. Bids May 22. Awarded July 22.

INDUSTRIAL, COMMERCIAL & PUBLIC BUILDINGS

Proposed Construction

Ga., Byron—Dpt. Navy, 18 St. and Constitution Ave. N.W., Wash. 25, D. C. administration, maintenance, shops, medical bldg., storage and supply handling, railroads, fencing and utilities at Naval Supply Depot. $9,000,000.

Ky., Louisville—Martin L. Adams & Sons, Joshua Adams, pres., 512 W. Ormsby Ave., 650-700 apartment units, on 45 acres, shopping center on 10 acres, Bardstown Rd. Goldsmith's Lane, $8,000,000.

Mich., Bell—Kelley Island Lime & Transport Co., Alpena, limestone plant, incl. pier for lake carriers to load fluxtone in Presque Isle County, on Lake Huron Shore, $8,000,000.

B. C., Essendale—Dpt. P. Wks., Victoria, 300-bed mental hospital unit and 3 story rein.-con. TB unit, approx. $3,000,000.

DOSSERT Connectors FOR WIRE AND CABLE

TYPE BC

TYPE CC

TYPE UD

TYPE TC

Dossert Clamp Type Connectors for Cable and Wire are made of a high conductivity copper alloy. Designed with maximum conductive and contact areas insuring cool operation under all load conditions.

Shoulder retained bolts permit complete assembly with a single wrench.

All series of connectors also available with hex head bolts.

Write for Catalog 45-1. For use with aluminum conductors, add suffix HSN to catalog number.

Immediate delivery on all standard items

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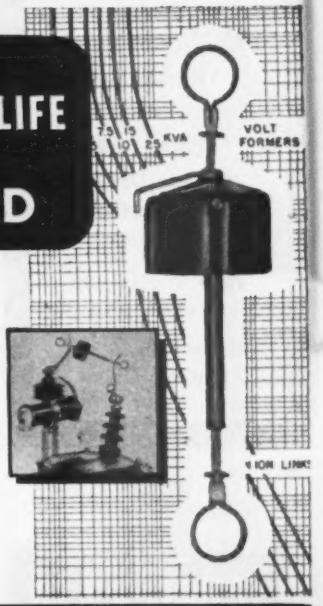
SINCE 1904

INCREASE TRANSFORMER LIFE with LOADGUARD



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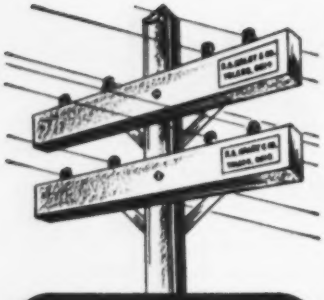

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CATALOGS • BULLETINS

● WATTHOUR METERS—A new display brochure, made available by Sangamo Electric Co, Springfield, Ill., explains the important influence of modern metering on the revenue of the electric power industry. Illustrated with photographs, the 20-page brochure tells the story of modern watthour meters—how they are made and how they serve the power company's interests most effectively while assuring good public relations through sustained accuracy, facilitating fair pricing, reducing operating costs, saving maintenance expense.

● ELECTRICAL RIGID CONDUIT—Alcoa has recently published an 8 pg booklet on their electrical rigid conduit. The booklet lists advantages, installation fittings, dimensions and weights. Copies may be obtained from the Aluminum Company of America Gulf Bldg, Pittsburg 19, Pa.

● LEAK DETECTOR: A new data sheet describing the Halogen-Sensitive Leak Detector, Type LD-01, produced by Distillation Products Industries, a division of Eastman Kodak Company, Rochester 3, N. Y. has just been produced by the company. The instrument reveals leaks in high vacuum systems by responding to small traces of probe gases, generally halogen-bearing compounds such as Freon Gas, which are sprayed externally at suspected leakage points. It is designed as an aid in maintaining high vacuum systems at top operating efficiency. Probing procedures for use with the unit and installation and maintenance data are included. A copy of the data sheet may be obtained by writing to Vacuum equipment department.

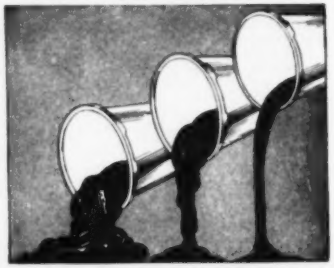
● HYDRAULIC SYSTEMS: A new 28 page two color Bulletin No 701 on hydraulic cylinders has just been released. This bulletin describes the complete line of Hydraulic cylinders manufactured by the Air and Hydraulic Division of Lindberg Engineering Company of Chicago, Ill. Diagrams, photos and charts explain the different mounting types and capacities of hydraulic cylinders up to 1500 PSI and 3,000 PSI working pressure. Request this reference book from Lindberg Engineering Company, 2443 W Hubbard Street, Chicago 12, Illinois. For additional editorial information or photos write to H. W. Bluethe.

● SWITCHES & SOCKETS: A 40-pg catalog that is sectionalized for easy reference has just been released by the McGill Manufacturing Company, Inc, Valparaiso, Indiana. One section describes and illustrates the complete line of Levolier switches and sockets including several new models. Another covers portable lamp guards, wall and receptacle guards, lamp changers and accessories. Included in this section is the new 5500-G series grounded lamp guard for use with the three wire grounded electrical systems used in many modern plants. Copies are available by writing to the company.

● PRECISION MEASUREMENT: Metron technical data sheet No 48HJK, describing high accuracy, portable tachometers for making speed measurements with precision and convenience otherwise unavailable in a small, portable, continuously indicating instrument is now available from the Metron Instrument Co 423 Lincoln St Denver 9, Colorado. Inherent stability, ruggedness, and simple calibration insure sustained accuracy, even when operated under adverse conditions.

● PLANT EQUIPMENT: The Swartwout Company, 18511 Euclid Ave Cleveland 10, Ohio manufacturer of electronic process control and power plant equipment, announces a new six-page bulletin on the Swartwout Autronic Controller. In addi-

Insulating and Cable-Pulling
COMPOUNDS
of Record-Breaking Performance



Mineralloc gives you a complete assortment for every need: dense, viscous and fluid consistencies for high and low voltages in cable-joints, pot-heads, terminal bills, distribution cables, street lighting, telephone work. . . . Insoluble in oil or water, for all temperatures. Clean, safe, economical—outranks all others in quality.

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Galvanized Steel
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tion to giving a brief resume of the Autronic principle, the new bulletin describes in detail the Swartwout Autronic Controller. It is printed in two colors and is illustrated with photographs, schematic diagram and dimensional drawings. The bulletin describes the Swartwout Autronic Control System as the first miniature all-electronic system for controlling pressure, temperature, flow and level. Copies of Bulletin A-702 are available on request.

● PARTS CATALOG: The Allied Radio Corp 833 W Jackson Blvd Chicago, Ill. distributors of radio and electronics parts and equipment, have released their 1953 general catalog. Reflecting the continuing growth of the industry, the new catalog contains 236 pgs listing 18,000 items. Special emphasis has been placed on equipment for industrial maintenance, research and production requirements. There are detailed listings of standard and special-purpose electronic tubes, test instruments, voltage stabilizers, transformers, resistors and capacitors. Also listed are such sound equipment components as high-fidelity amplifiers, tuners, speakers, changers, pickup arms and cartridges, microphones and other accessories. Copies are now available.

● MOTOR SPEED CONTROLS: General Radio Co 275 Massachusetts Ave, Cambridge 39, Mass. have issued a new catalog describing in detail all of their Variac® speed control. Technical information including speed torque curves and typical applications are given on all models. Copies will be sent upon request.

● BRUSH CONTROL: How to clear the rights-of-way with Thompson Brambicide Brush Killers is described in a 4 pg folder just released. The three ways, foliage spraying, basal bark and stump treatment are given. Copies may be obtained from Thompson Chemicals Corp, St. Louis 3 Mo or Los Angeles 27, Calif.

● WIRE PRODUCTION: A new 4-page folder titled "X-Ray Helps Produce Better Wire by New Methods Which Analyze Crystal Structure of Base Metals" is available gratis from C J Woods, North American Philips Company, Inc, 750 South Fulton Avenue, Mount Vernon, N. Y.—Illustrated with photos, drawings and charts, the new folder describes operating principles for X-ray film diffraction, the Geiger-counter X-Ray Spectrometer, and the X-ray Spectrograph (fluorescence analysis). Application of the three techniques to problems involving metals and wire is also discussed.

● SCREEN ROOMS: Up to the minute data on screen rooms (shielded enclosures) and ther uses in meeting JAN-I-225, 16E4 (ships), MIL-I-6181 as well as civilian specifications for radio interference suppression are included in Shielded Enclosure Bulletin No 2 just issued by the Ace Engineering & Machine Co Inc 3644 N. Lawrence St, Philadelphia, Pa. Copies will be sent upon request.

● OSCILLOGRAPHY—A new, 12 pg bulletin has recently been issued by the Allen B DuMont Laboratories Inc, Instrument Div, 1500 Main Ave Clifton, N. J. The catalog gives full details and description including photographs of the new DuMont Type B04-A Cathode-ray Oscillograph. Direct inquiries to the company.

● PRESSURE SEAL VALVES: A new sixteen page catalog describing Pressure-Seal stop, check and non-return valves has just been issued. Separate spreads in the booklet give complete descriptions, design characteristics and dimensional details on stop, check and non-return valves. Cut away photographs and drawings illustrate the pressure-seal construction and the Edward Equalizer, explaining their many advantages including lower pressure drop, less seat-disk wear and lower maintenance. Copies may be secured by writing Dept N R Edward Valves, Inc, 1200 West 145th Street, East Chicago, Indiana.

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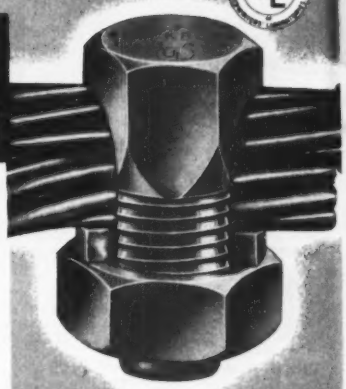

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TECHNICAL LITERATURE

Design Manual—The Aircraft Industries Assoc has just published a revised edition of the *Design Manual on Aircraft Electrical Installations*. It contains data not available from any other source and is based on practical experience and design knowledge of leading industrial engineers. The manual's price has been reduced to $1.00 per copy. It may be obtained by writing the Aircraft Industries Assoc of America Inc, 610 Shoreham Bldg, Washington 5, D. C.

Guy Clamps—The new specifications manual No TD-23 for Guy Clamp has been released by the Edison Electric Institute. It has been approved by the Transmission and Distribution Committee. For further information write the EEI, 420 Lexington Ave, New York 17, N. Y.

Consulting—*The Consulting Chemist and Chemical Engineer in a World Economy* has recently been published by the Association of Consulting Chemists & Chemical Engineers Inc, 50 East 41st St, New York 17, N. Y. This bound and illustrated 32 pg book is available at $1.00 per copy and should be of valuable assistance to the management of industry.

Ceramic Coatings—The conservation of strategic materials and extention of the life of metals used at high temperatures through the use of ceramic coating is discussed in a new brochure that has recently been published. Included are a comprehensive outline of benefits, design features and properties of Solaramic coatings. The brochure is available without charge from the Research Products Division Solar Aircraft Co, San Diego 12, Calif.

Static Problems—A new five pg paper discussing static problems that are now present in the textile industry is being distributed. It treats the processing of synthetic fibres such as acetate yarn, nylon, fiberglass orlon and others. Present control methods are summarized in relation to their efficiency and uses in reducing static. Schematic diagrams are included in this paper published by the John Hewson Co, 106 Water St, New York 5, N. Y.

Literature Index—A new 20 pg index of technical literature is now being made available from the Industrial Div, Minneapolis-Honeywell Regulator Co, Wayne & Windrim Aves, Philadelphia 44, Pa. It consists of both a numerical listing and an alphabetical cross index for specification sheets, instrument data sheets and catalogs. Refer inquiries to station 42 at the above address.

Materials Handling Costs—A new, illustrated, 2 color, 16 pg brochure entitled *The Science of Economical Shelf Storage* has recently been released by the Frick-Gallagher Mfg Co, Willston, Ohio. It discusses the many benefits of using Rotabin rotary shelving for store parts, tools, and materials more efficiently. Write the company for free copies.

Aluminum Conductors—*Making Good with Aluminum* is the name of a new booklet issued by the Thomas & Betts Co, Elizabeth, N. J. Characteristics, conductivity, oxide coating, susceptability to mechanical change, expansion and contraction due to temperature change, and electrolytic action are fuly discussed. Address inquiries to the company.

Titanium Forgings—An informative booklet on the use of titanium forgings for jet engines is now being distributed by the General Electric Co, 1 River Rd, Schenectady 5, N. Y. Copies may be had upon request.

Mechanical Properties—A new booklet containing 12 pgs with 13 charts with 3 tables and numerous photo micrographs

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Nickel—Data sheets that show the wide range of properties that may be obtained in electro deposited nickel by varying the solution and plating procedure has recently been released. Write for copies to International Nickel, Dept. E2, New York 5, N. Y.

Nomenclature—A 20 pg booklet on nomenclature for Aluminum sheet and plate, aluminum extruded and tubular products has been published to promote a better understanding between producer and consumer. Copies may be obtained from the Aluminum Association, 420 Lexington Ave, New York 17, N. Y.

High Voltage Rectifier—A report just released to the public by the Office of Technical Service of the Department of Commerce describes a high voltage dry-disc rectifier. Composition and coatings tried are fully discussed along with the many variations of each coating method. PB 106312, Final Report, Selenium Rectifiers, High Voltage, Plate containing 78 pages including photos, diagrams, and graphs sells for $10 in photostat and $3.50 in microfilm form. Address orders to the Library of Congress, Photo Duplication Service, Public Board Project, Washington, D. C.

Solderless Wiring Devices—An illustrated brochure *The Harrisburg Story* has just been published by Aircraft-Marine Products, Inc, 2100 Paxton St, Harrisburg, Pa. The book describes in 20 pgs the origin, growth, business philosophy and engineering principles of the company. Requests for copies will receive prompt attention.

Industrial Heaters—A new 8 pg, 2 color brochure explaining Thermobloc, designated GNC-10-52 has recently been released by Thermobloc, a division of Prat-Daniil Corp, 80 Norwalk, Conn. Copies may be obtained upon request to the company.

Capacitor Paper—*The Measurement of the Thickness of Capacitor Paper* by Wilmer Sauder and S. B. Newman, National Bureau of Standards, Circular 532 is now available. This circular describes and analyzes measurements made at NBS on some commercial thin capacitor papers by means of an interferometer, micrometer microscope, mechanical micrometers and surface analyzer. Address inquiries to the National Bureau of Standards, U. S. Dept. of Commerce, Washington 25, D. C.

Aluminum Electrical Conductor—The National Electrical Contractors Association, Inc, 610 Ring Bldg, Washington, D. C. has published an 8 pg brochure entitled *Report on Aluminum Electrical Conductor*. It was prepared with the aid of the electrical industry and government construction agencies because of the current demand for aluminum to replace copper. Copies are available from the NECA or the Thomas & Betts Co, Elizabeth, N. J.

Ingot Molds—Electric steel ingot practice for seamless tube manufacture is described in a new 11 pg booklet made available by the Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Priced at $.50, P.B. 106027 treats electric furnace operation and techniques for pouring steel into ingot molds.

Metal Corrosion—A technical advisor to keep the reader up to date on the latest methods for fabricating and processing aluminum and its alloys is now available. This 4 pg paper will be sent free to interested parties upon request to the Reynolds Metals Co, Technical Editorial Service, 2500 So Third St, Louisville 1, Ky.

Electrometer Applications—A new 2 page article reprint discussing vacuum tube electrometer applications is presently being distributed by Keithley Instruments, 3868 Carnegie Ave, Cleveland 15, Ohio. Basic advantages and several circuit schematic diagrams and many measurements of potentials currents, capacitance and resistance are included.

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BOOK REVIEWS

Report Writing

Writing the Technical Report, Third Edition. **By J. Raleigh Nelson. Published by McGraw-Hill Book Co, New York 36. 356 pages. Price $4.50**

Adoption of the second edition (1947) of this book for training of research personnel by the U. S. Navy provided the author with additional material which has been incorporated in the third edition. The book comprises five sections viz: (1) design and composition of a report, (2) setup of long- and short-form reports, (3) procedure for criticism, (4) a summary for ready reference, (5) a plan for instruction or study of report writing. Copious examples are included to illustrate the text. While written primarily for college instruction of upper class and graduate students, this book should prove helpful for study and reference to men in industry who seek to improve their report writing ability.

Higher Mathematics

Methods of Applied Mathematics. **By F. B. Hildebrand. Published by Prentice-Hall, Inc, New York 11. 525 pages. Price $7.75**

While describing the book correctly, the title of this volume suggests a much simpler mathematical discussion than is contained in it. It is the mathematics of the physicist with which the book deals primarily. Its four chapters cover, first, matrices, determinants and linear equations; second, calculus of variations and applications; third, difference equations; and, fourth, integral equations. The aim of the book is to present these topics in applicable form without going deeply into their derivations from the point of view of classical mathematics. It presupposes that the student has a knowledge of mathematics of about the level of advanced calculus.

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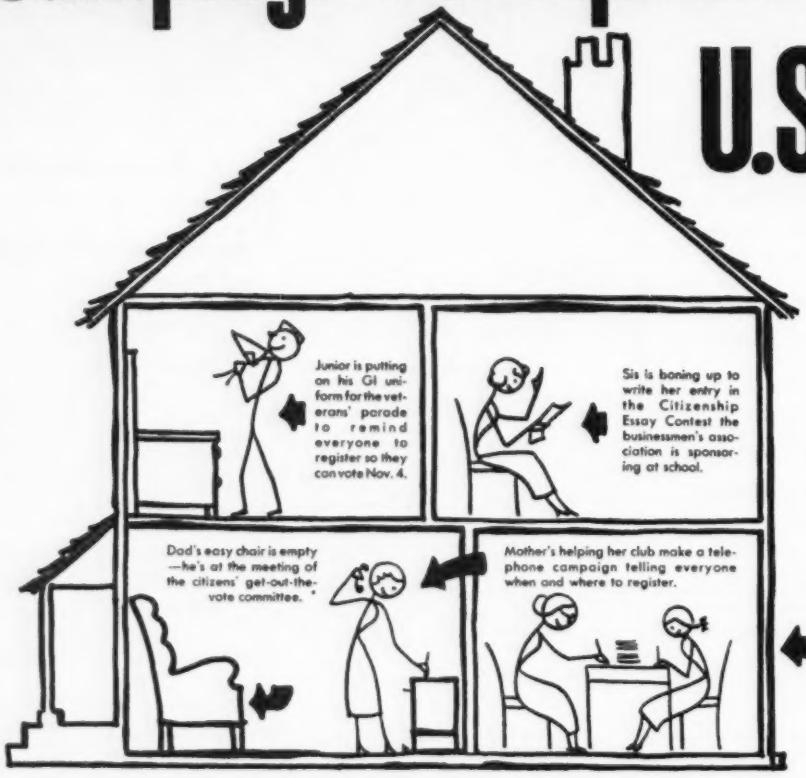
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Switchgear Design Executive

Opportunity to establish and direct a switchgear design section including large air circuit breakers for leading electrical equipment manufacturer in Midwest. Must have had considerable experience in that specific field as well as both demonstrated design ingenuity and administrative ability. Unusual opportunity. Salary open. Give personal history, education, experience and compensation requirements. Will protect present employment.

P-5540, Electrical World
520 N. Michigan Ave., Chicago 11, Ill.

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Leading manufacturer of electrical distribution and motor control equipment is expanding permanent engineering staff. Wants electrical equipment designers—preferably but not necessarily with circuit breaker, safety switch, bus duct, panelboard, switchgear, or electric motor control experience. Midwestern location. Pension plan and liberal insurance program. Excellent opportunity for advancement. Salary open. Give personal history, education, experience and compensation requirements. Will protect present employment.

P-5546, Electrical World
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ENGINEERS FOR SALES PROMOTION WORK

Good openings for recent engineering graduates for sales promotion work with large electric and gas utility company operating in upper New York State. Starting rate approximately $4,000 per year. Union shop. Address letter outlining qualifications to:

P-5442 Electrical World
330 W. 42nd St., New York 36, N. Y.

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- for every industrial and power application.
- Special constructions. Odd lengths.
- Large stocks on hand of high voltage, lead covered cables not ordinarily stocked by your regular supplier.
- Cut to length. Reasonably priced.

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33000 P.V. — 2400 S.V.
World's Largest Inventory
Motors—Generators—Transformers
ELECTRIC EQUIPMENT CO.
P. O. Box 51 Rocester, N. Y.

WANTED

POWER SALES SUPERVISOR

Electric utility serving in Central Eastern Seaboard desires an experienced man to supervise Power Sales Department and to be responsible for industrial development in a rapidly growing area. Excellent opportunity for a man who is qualified for future advancement. Salary depending on experience and ability. Applicant please give age, education and experience record.

P-5083, Electrical World
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and for sale.
Particulars please.
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214 E. 41 St., New York 17, N. Y.

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NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

ASSISTANT OFFICE Engineer, recent Electrical Engineering graduate with some practical experience in office work and procedure, for work large Copper Company, Chile, South America. 3-year contract, transportation both ways and salary while traveling paid by company. In reply give complete details. P-5499, Electrical World.

PROMINENT PITTSBURGH consulting engineering firm has positions open for graduate electrical engineers and draftsmen with experience in substation, transmission, and distribution design. Utility experience desirable. Positions permanent. Send full particulars of experience and asking salary to Peter F. Loftus Corporation, First National Bank Building, Pittsburgh 22, Pennsylvania.

SYSTEM PLANNING Engineers. Graduate electrical engineers wanted to assist in planning the electrical development of a large metropolitan electric utility in northeastern part of the United States. Work consists of determining the location, size, and method of connections for additional generating capacity, and associated transmission lines and switching; distribution lines and associated substations. This work involves many electrical calculations to determine load distribution, short circuit current, stability, voltage regulation, and involves the use of AC and DC Calculating Boards. Applicants to be not over 30 years old, with BS in EE from an accredited college or university. Salary range $3600 to $5200, depending upon experience and education. Experience record, education, salary expected, and recent photograph should be submitted with the letter of application. P-4301, Electrical World.

WANTED: MANAGER for small circuit breaker manufacturing business. P-5347, Electrical World.

SELLING OPPORTUNITY OFFERED

SALES, AGE 25-30, some technical background desirable contacting utilities industry, long-established specialized firm Chicago Branch. State age, education, experience, references, salary. SW-5165, Electrical World.

EMPLOYMENT SERVICE

SALARIED PERSONNEL, $3,000-$25,000. This confidential service established 1926, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. L, 241 Orange St., New Haven, Conn.

SALARIED POSITIONS $3,500 to $35,000. We offer the original personal employment service (established 42 years.) Procedure of highest ethical standards is individualized to your personal requirements. Identity covered, present position protected. Ask for particulars. R. W. Bixby, Inc., 262 Dun Bldg., Buffalo 2, N. Y.

POSITIONS WANTED

INDUSTRIAL ELECTRICAL Engineer desires engagement as consultant supervisor, capable and experienced in design, estimating, maintenance, or expediting. American, married, age 40. PW-5481, Electrical World.

ELECTRICAL ENGINEER, Graduate, M.S. E.E.; 43, married, one child; over 10 years experience public utility design oper., and maint. References available. S.W. United States preferred. Available for interview. PW-5422, Electrical World.

ELECTRICAL PROJECT and application engineer, 27, experienced design group leader in both dc closed cycle and ac open cycle control systems for industrial drives. Nearly five years with large electrical manufacturer and two years in Navy electronics. Write PW-5572, Electrical World.

U. S. Government

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Invitation No. DS-3802) will be received at Denver, Colorado, until October 23, 1952, for furnishing one 115,000- to 4,000-volt, 11,200/14,000-kva, 3-phase, class OA/FA, outdoor power transformer; and two 115,000-volt, 3-pole, 800-ampere, 1,500,000-kva, outdoor power circuit breakers for Chandler Power and Pumping Plant Switchyard, Yakima Project, Washington. Delivery is desired within 310 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Denver, Colorado.

SUBSTATION EQUIPMENT

TRANSFORMERS

Qu.	KVA	MFR.	VOLTAGE
4	500	Pitts.	66000-33000—13200-23000 Y
1	333	G. E.	69000—2400/72 0
3	200	Pitts.	66000—2300
3	75	A. C.	66000/24000—7200/12470 Y
2	200	West.	45000—2400/7200
4	150	West.	44000-33000—2300/6900
3	100	G. E.	44000—2300
3	75	West.	44000—7200/12470 Y
3	5 00	G. E.	38100-66000—6600
1	18750	A.B.B.	34840—1100, 3 ph.
4	200	A. C.	34500—6900/11950
4	200	G. E.	34500—230/460
3	100	West.	33000—240/480 NEW
3	100	A. C.	33000—7200/12470 Y
3	75	Wag.	33000—7200/12470 Y
4	450	A. C.	25410/44000—13280/23000
6	100	G. E.	22000—7200/12470 Y
9	50	G. E.	22000—2300
3	37½	G. E.	22000—6900
1	6000	Mol.	13800—460, 3 ph.
1	450	Penn.	13200—2400, 3 ph.
6	200	G. E.	13200—2300
3	200	G. E.	13200—230/460
4	750	G. E.	11000—440
3	250	Pitts.	7200—230/440
3	150	Wag.	6900—2300
3	37½	G. E.	6900—230/460
2	100	G. E.	4800/2400—480/240
3	1500	A. C.	2300/4000 Y—2300
3	333	G. E.	2300—230/460
1	100	G. E.	2300—575, 3 ph.
6	50	West.	2400—114/228 DRY TYPE
3	20	West.	2200—575

INDUCT. REGULATORS—OUTDOOR

1—140 KVA G. E. 200 A. 4000 V. 3 ph.
4— 60 KVA West. 250/500 A. 2400 V. 1 ph.
6— 48 KVA G. E. 200 A. 2400 V. 1 ph.
8— 36 KVA West. 150/300 A. 2400 V. 1 ph.
2— 36 KVA G. E. 75/150 A. 4800 V. 1 ph.

CIRCUIT BREAKERS

1— 600 A. 73 KV G. E. FHKO-236-500 MVA
1— 400 A. 37 KV G. E. FHKO-236-500 MVA
1—1200 A. 15 KV G. E. FKO-139-350 MVA
4— 600 A. 15 KV G. E. FHKO-139-750 MVA
1— 600 A. 15 KV G. E. FHKO-136-250 MVA
1— 400 A. 15 KV G. E. FHKO-136-350 MVA

BREW, WOLTMAN & CO., INC.
52 Church St. New York 7, N. Y.

DIESEL POWER

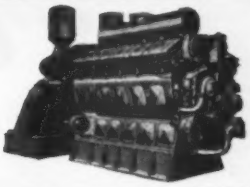
FOR

IMMEDIATE SHIPMENT

UNIT CAPACITIES—10 TO 1875 KVA

A.C.—50 AND 60 CYCLES

VARIOUS VOLTAGES



A PARTIAL LISTING OF OUR INVENTORY

KW	Make	Model	HP	RPM	KW	Make	Model	HP	RPM
1136	Fairbanks Morse	38D	1600	720	220	Enterprise	DSO-6	400	450
1100	General Motors	16-278A	1800	720	300	General Motors	3-268A	450	1200
1000	G neral Motors	16-567B	1440	720	300	General Motors	3-268A	350	900
750	General Motors	12-567	1080	720	100	General Motors	3-268A	150	1200
500	General Motors	8-278A	750	720	100	Worthington	BB-5	150	600
300	General Motors	6-567	720	720	60	General Motors	6-71	90	1200
250	Baldwin	VO-6	510	450	50	Internat'l Harvester	UD-14	45	1200
220	Buckeye	80	480	600					

D.C. UNITS ALSO AVAILABLE

A. G. SCHOONMAKER COMPANY, INC.
ENGINE DIVISION, 50 CHURCH ST., NEW YORK 7, N. Y.

FROM AVAILABLE STOCK

TURBO GENERATORS

Qu	KW	Make	Desc.
1	—6000	Al. Ch.	Condensing 200/250 I.S.P. 2300 v 3. 60 Exc & Surf cc Cond.
1	—750	G.E.	Condensing — 425 lbs., 750 TT I.S.P. 440 v 3 ph. 60 cy.— Built 1944
1	—500	Moore	Non-condensing 150/200 lbs I.S.P. 5/35 lbs. G.B.P. 3/60/480 volt Direct Connected Exciter
1	—400	Westg.	Non-condensing — 125/150 lbs I.S.P. 5/10 lbs. B.P.— 240/480 v. 3 ph. 60 cy.
1	—300	G.E.	Non-condensing 150/175 I.S.P. 5/10 B.P.— 480 v. 3 ph. 60 cy.

SYNCHRONOUS CONDENSERS

KVA	Make	Type	Volts	Speed
1—5000	Whse.		2400/4150	600

MOTOR GENERATOR SETS

3 ph. 60 cy.

Qu	KW	Make	Speed	DC Volts	AC Volts
1—	2000	G.E.	514	600	6600/13200
2—	2000	G.E.	300	666.25 cy.	11000
1—	1500	G.E.	720	600	13200
1—	1500	G.E.	720	275	2200 4400
3—	1500	G.E.	514	250	6600/13200
1—	1000	G.E.	900	250	4100/6900
1—	1500	G.E.	900	600	2300/4150
2—	1000	Whse.	900	600	2300/4158
1—	500	Whse.	900	250	6600/13200
1—	500	Whse.	1200	125/250	2300
1—	500	Whse.	900	250	440
1—	500	G.E.	720	125	2300
1—	400	G.E.	720	250	440/2300
1—	350	G.E.	900	125	4150
1—	150	G.E.	1200	275	2300
1—	150	Whse.	1200	275	2300

TRANSFORMERS—60 Cycle

KVA	Make	Type	Ph	Voltages
2—1250	G.E.	HVDDJ		6600x550
1—1150	A.C.	OISC		13200x4160/2400
3—1000	G.E.	HVDDJ	1	2200x480
9— 300	G.E.	HT	3	24000x240/480

BELYEA COMPANY, INC.
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LINER KITS — LINERS
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We carry a large stock of transformers, and invite your inquiries. New Transformers built to your specifications.

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We rewind, repair and redesign all makes and sizes.
One Year Guarantee.

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"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
SINCE 1912 CINCINNATI 27, OHIO

WORLD'S LARGEST INVENTORY

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MOTORS-GENERATORS-TRANSFORMERS
New and Guaranteed Rebuilt
1 H.P. to 2500 H.P.

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P. O. BOX 51, ROCHESTER 1, N.Y.

TURBO GENERATOR

Available Immediately
7500 KW G.E. Cs.
180 P.S.I.—535°F Total Temp.
3 phase 60 cycle 2300 volt
With Surface Condenser
GOOD CONDITION

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TRANSFORMERS

1—1500 KVA G.E., 3 Ph., 4150V. 2300V Pyranol
2— 750 KVA G.E., 3 Ph., 4150V. 120/240V., sec.
2— 400 KVA Pitts., 1 Ph., 2400/4800V pri. 240/480V sec.
1— 333 KVA Whse., 1 Ph., 2400V. 600 V sec.
1— 200 KVA G.E., 3 Ph., 4150V. 120/240V. sec.
1— 200 KVA G.E., 3 Ph., 2400-220 Sec.

SYNCHRONOUS MOTORS

1— 300 H.P., Elec. Mach., 720 RPM, 3 Phase 60 cyc., 2200V T E F Cooled Outdoor service.
1— 150 H.P., G.E., 1800 RPM, 220V.
2— 150 H.P., Al. Chal. 360 RPM, 440V.

MOTOR GENERATOR SETS

1—1000 KW G.E., 600 V. 514 RPM, 4000V 3n.
1— 200 KW Whse., 275V, 900 R.P.M., 220 V 3ph.
1— 175 KVA West., 1Ph., 220V, Motor 3Ph., 460V.
1— 150 KW G.E., 120/250V, 1200 RPM, 2300 3ph.
1— 100 KW G.E., 250V, 900 RPM, 2300V, 3ph.
1— 75 KW C.W. 250V, 1200RPM, 2300/4150V3ph

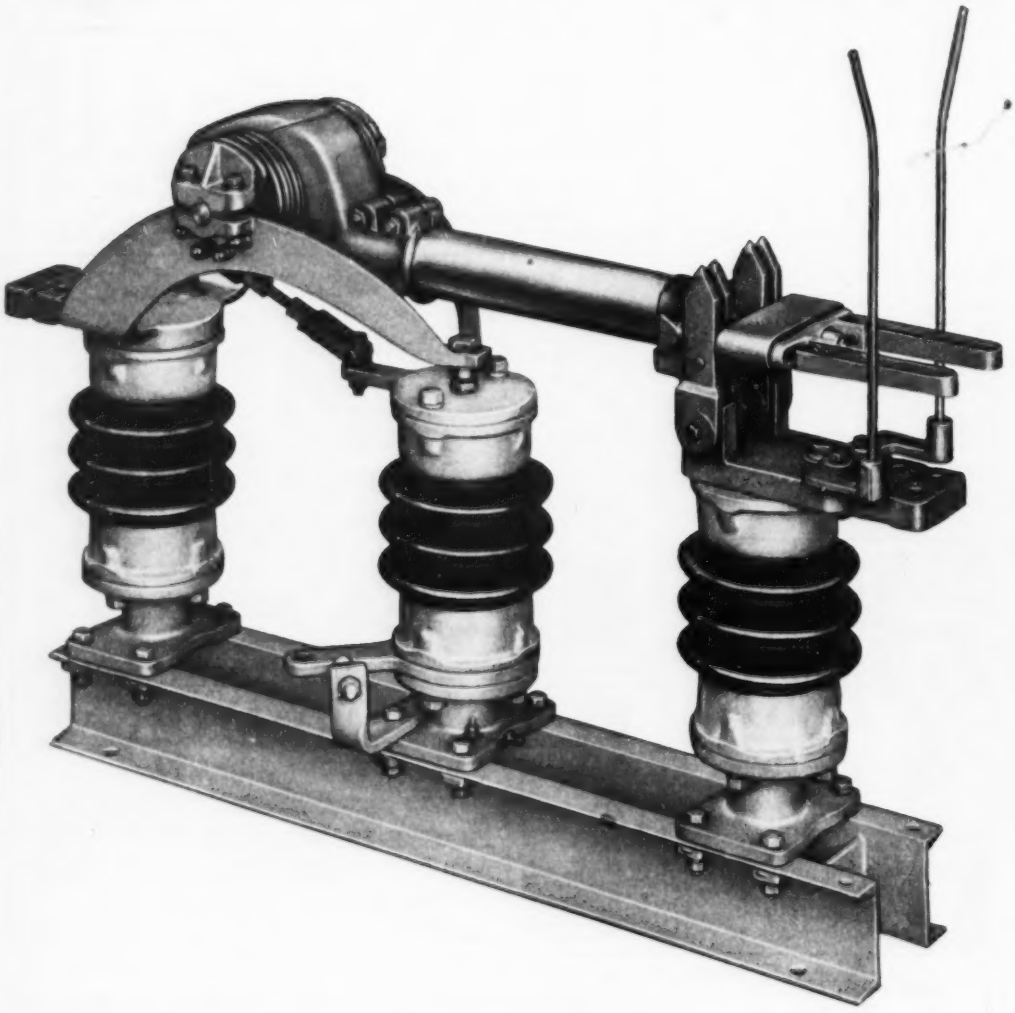
SLIP RING MOTORS

1— 400 H.P., West. CW, 450 RPM 550V.
1— 250 H.P., West., CW, 600 RPM, 440V.
1— 200 H.P. West., CW, 600 RPM, 440V.
1— 100 H.P., G.E., MT 600 RPM 440V.
1— 100 H.P., G.E., IM 400 RPM 440V.

Large Stock of A.C. and D.C. Equipment

Cole Electric Co.

8439 Steller Drive | TExas 0-4701 | Culver City, Calif.



AIR BREAK DISCONNECTING SWITCH

7,500 Volts—2,000 Amperes—Type 0-2

Vertical break. Three pole. Single throw. Group operated.

One Pole Shown.

SILVER TO SILVER CONTACTS

"Stab-lok's

REGISTRATION APPLIED FOR

tops on 6 big counts!"

THERE'S NOTHING ELSE on earth like Federal Noark Stab-lok. Stab-lok is vastly more than a circuit breaker... it's today's most modern and flexible circuit protection system. Constant development has made it the most complete line on the market. Single pole and double pole simultaneous trip Stab-lok breakers come in a standard 15 to 50 amp. range of calibrated ratings. The double pole breaker is exactly twice the width of the single pole, and both are readily interchangeable.

And now look at the full combination of six big advantages that you get *only* with the Stab-lok system! For absolute dependability, perfect adaptability and lowest installation cost, join the stampede to Stab-lok—today.

1 **BIG, FULL-SIZE BREAKER.** There's no skimping in size. Stab-lok is a big, husky, breaker. Independent tests show it uses metal where it counts, carrying current, has fewer and more rugged parts.

2 **MILLIONS TESTED.** Stab-lok's dependability has been proved under every sort of service condition and on millions of installations. It's the one popular breaker in which you can place full confidence.

3 **COMPLETE RANGE.** Only Stab-lok system gives a full range of 9 basic and many special enclosures. 3MBA, for example, converts a multibreaker into a Stab-lok, easily, economically.

4 **LOWEST INSTALLED COST.** Stab-lok is easiest, most economical to install. Enclosures have ample wiring space... backplate removable for wire pulling... all components accessible.

5 **4-WAY STABS.** The stabs are an exclusive Noark feature; provide safest, easiest method of breaker insertion. 4-way stabs make positive contact with special main busses and lock into place instantly.

6 **COMBINATION FLUSH-SURFACE ENCLOSURES.** Most Stab-lok enclosures are combination type for flush or surface mounting. This practically halves the stock of enclosures needed for all requirements.

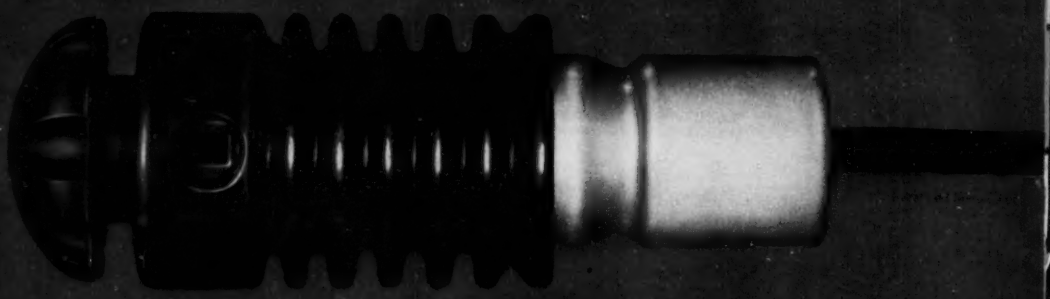
Write for full information... and order Stab-lok from your distributor

FEDERAL ELECTRIC PRODUCTS COMPANY
50 Paris Street, Newark 5, N. J.

FEDERAL NOARK®

Federal NOARK

THERE CAN BE NO DOUBT . . .



KOHLMAN contributed this to the electrical industry

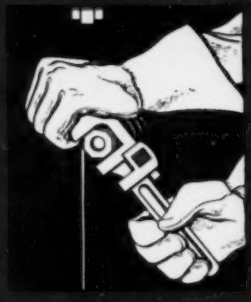
IT BEGAN IN 1939 . . . seeing the need for a safer, more convenient way of making primary line connections, Kohlman in 1939 introduced the "Quick-Grip" bushing. It was the *first* bushing with insulated connector. For several years thereafter only Kohlman transformers were equipped with knob-type bushings.

THIS FOLLOWED . . . gradually the user-demand for this bushing became so great that other transformer manufacturers followed Kohlman's lead and began equipping their transformers with knob-type bushings. Today these bushings are on the way to becoming a standard feature.

THEN, IN 1952 . . . Kohlman improved the "Quick-Grip". The bushing is now equipped with a molded hard rubber knob instead of a porcelain knob. It's always a bushing that is even safer and more convenient to use.

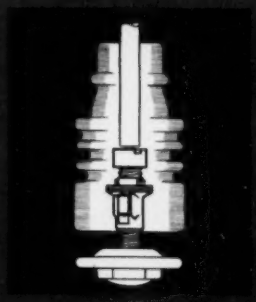
MAKE NO MISTAKE . . . the knob-type bushing is definitely a Kohlman "First". The "Quick-Grip" . . . with porcelain or rubber knob . . . is distinctively Kohlman. Kohlman got only ideas people with but frequently leads the industry.

The evolution of the "quick-grip" bushing

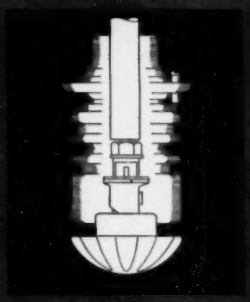


Here is the way primary connections were made prior to the introduction of the "Quick-Grip" bushing. The terminal had to be connected and disconnected with a wrench, a hazardous operation requiring more time, more energy, and more gaskets.

This is the way connections are made with a "Quick-Grip" bushing. No tools are required, no live parts are exposed. The linesman inserts the terminal, twists the knob, and the job is done.



This is a cross-section view of the "Quick-Grip" bushing with the porcelain knob. The metal part was fitted into an insert in the porcelain knob which was then filled with lead to hold it fast.



The newer "Quick-Grip" bushing has the metal part molded into the hard rubber knob as the knob is formed. The knob has a better shape for gripping, weathers well, and eliminates any risk of cracking or breaking.

Kuhlman ELECTRIC COMPANY, BAY CITY, MICHIGAN

K E